UMD GRADUATE CATALOG

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TABLE OF CONTENTS

Home 14

Graduate Catalog 15

The Graduate School 16

Introduction to the University of Maryland 17

Programs 19

- Accounting (BMAC) 23
- Accounting, Master of Science (M.S.) 24
- Additive Manufacturing, Master of Engineering (M.Eng.) 25
- Additive Manufacturing (Z115) 25
- Additive Manufacturing (PMAM) 26
- Additive Manufacturing, Post-Baccalaureate Certificate (P.B.C.) 26
- Administration, Supervision & Curriculum (Z900) 27
- Administration, Supervision & Curriculum, Certificate of Advanced Study (C.A.S.) 27
- Aerospace Engineering (ENAE) 27
- Aerospace Engineering, Master of Science (M.S.) 28
- Aerospace Engineering, Doctor of Philosophy (Ph.D.) 28
- Aerospace Engineering, Master of Engineering (M.Eng.) 29
- Aerospace Engineering (PMAE) 29
- Aerospace Engineering, Post-Baccalaureate Certificate (P.B.C.) 30
- Aerospace Engineering (Z053) 30
- African American Studies, Post-Baccalaureate Certificate (P.B.C.) 31
- African American Studies (Z096) 31
- Agricultural and Resource Economics, Master of Science (M.S.) 32
- Agricultural and Resource Economics, Doctor of Philosophy (Ph.D.) 32
- Agricultural and Resource Economics (AREC) 33
- Air Quality Science and Technology, Post-Baccalaureate Certificate (P.B.C.) 35
- Air Quality Science and Technology (Z047) 35
- American Studies, Master of Arts (M.A.) 35
- American Studies, Doctor of Philosophy (Ph.D.) 36
- American Studies (AMST) 36
- Animal Sciences, Master of Science (M.S.) 37
- Animal Sciences, Doctor of Philosophy (Ph.D.) 37
- Animal Sciences (ANSC) 38
- Anthropology and Historic Preservation, Master of Applied Anthropology and Master of Historic Preservation (dual degree) (M.A.A. and M.H.P.) 39
- Anthropology, Master of Applied Anthropology (M.A.A.) 40
- Anthropology, Doctor of Philosophy (Ph.D.) 40
- Anthropology (ANTH) 41
- Anthropology and Historic Preservation, Master of Applied Anthropology and Master of Historic Preservation (dual degree) (M.A.A. and M.H.P.) 42
- Applied Anthropology and Historic Preservation (AAHP) 43
- Applied Counseling and Human Services, Post-Baccalaureate Certificate (P.B.C.) 44
- Applied Counseling and Human Services (Z069) 44
- Applied Economics, Master of Professional Studies (M.P.S.) 45
- Applied Economics (off-campus) (MPEC) 45
- Applied Economics, Master of Professional Studies (M.P.S.) 45
- Applied Economics (on-campus) (MPEM) 46
- Applied Entomology, Master of Professional Studies (M.P.S.) 46
- Applied Entomology (MPAE) 46
- Applied Mathematics & Statistics, and Scientific Computation, Master of Science (M.S.) 47
- Applied Mathematics & Statistics, and Scientific Computation, Doctor of Philosophy (Ph.D.) 48
- Applied Mathematics & Statistics, and Scientific Computation (AMSC) 49
- Architecture, Master of Architecture (M.Arch.) 50
- Architecture, Master of Science (M.S.) 51
- Architecture (ARCH) 51
- Architecture and Community Planning, Master of Architecture and Master of Community Planning (dual degree) (M.Arch. and M.C.P.) 53
- Architecture and Community Planning (ARCP) 54
- Architecture and Historic Preservation,Master of Architecture and Master of Historic Preservation (dual degree) (M.Arch. and M.H.P.) 54
- Architecture and Historic Preservation (ARHP) 55
- Architecture and Real Estate Development, Master of Architecture and Master of Real Estate Development (dual degree) (M.Arch. and M.R.E.D.) 56
- Architecture and Real Estate Development (ARDV) 57
- Art History and Archaeology, Master of Arts (M.A.) 59
- Art History and Archaeology, Doctor of Philosophy (Ph.D.) 59
- Art History and Archaeology (ARTH) 59
- Art Studio, Master of Fine Arts (M.F.A.) 61
- Art Studio (ARTT) 61
- Astronomy, Master of Science (M.S.) 62
- Astronomy, Doctor of Philosophy (Ph.D.) 63
- Astronomy (ASTR) 63

Atmospheric and Oceanic Science, Master of Science (M.S.) 65
Atmospheric and Oceanic Science, Doctor of Philosophy (Ph.D.) 65
Atmospheric and Oceanic Science (AOSC) 66
Atmospheric and Oceanic Science Technology, Master of Professional Studies (M.P.S.) 67
Atmospheric and Oceanic Science Technology (MPAO) 68
Atmospheric and Oceanic Science, Post-Baccalaureate Certificate (P.B.C.) 68
Atmospheric & Oceanic Science (Z046) 68
Beekeeping, Post-Baccalaureate Certificate (P.B.C.) 69
Beekeeping (Z088) 69
Behavioral and Community Health, Doctor of Philosophy (Ph.D.) 70
Behavioral and Community Health (BCHL) 70
Behavioral and Community Health, Master of Public Health (M.P.H.) 71
Behavioral and Community Health (MBCH) 72
Biochemistry, Master of Science (M.S.) 73
Biochemistry, Doctor of Philosophy (Ph.D.) 73
Biochemistry (BCHM) 74
Bioengineering, Doctor of Medicine and Master of Science (dual degree) (M.D. and M.S.) 75
Bioengineering, Doctor of Medicine and Doctor of Philosophy (dual degree) (M.D. and Ph.D.) 75
Bioengineering, Master of Science (M.S.) 75
Bioengineering, Doctor of Philosophy (Ph.D.) 75
Bioengineering (BIOE) 76
Bioengineering, Master of Engineering (M.Eng.) 77
Bioengineering (online) (MEBI) 77
Bioengineering, Post-Baccalaureate Certificate (P.B.C.) 78
Bioengineering (online) (Z083) 79
Bioengineering, Master of Engineering (M.Eng.) 80
Bioengineering (PMBI) 80
Bioengineering, Post-Baccalaureate Certificate (P.B.C.) 81
Bioengineering (Z054) 81
Biological Resources Engineering, Master of Science (M.S.) 82
Biological Resource Engineering, Doctor of Philosophy (Ph.D.) 82
Biological Resources Engineering (ENBE) 82
Biological Sciences, Master of Science (M.S.) 82
Biological Sciences, Doctor of Philosophy (Ph.D.) 83
Biological Sciences (BISI) 83
Biophysics, Master of Science (M.S.) 85
Biophysics, Doctor of Philosophy (Ph.D.) 85
Biophysics (BIPH) 86
Biostatistics, Master of Public Health (M.P.H.) 87
Biostatistics (BIOS) 87
Business Administration and Accounting, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.) 88
Business Administration and Accounting (BAAC) 89
Business Administration, Master of Business Administration (M.B.A.) 89
Business Administration (BMBA) 90
Business Administration Executive, Master of Business Administration (M.B.A.) 91
Business Administration (Executive) (CMBA) 91
Business Administration Executive, Master of Business Administration (M.B.A.) 92
Business Administration (Executive) (EMBA) 92
Business Administration and Finance, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.Fin.) 93
Business Administration and Finance (BAFN) 93
Business Administration and Information Systems, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.) 94
Business Administration and Information Systems (BAIS) 94
Business Administration and Marketing Analytics, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.) 95
Business Administration and Marketing Analytics (BAMA) 95
Business Administration and Nursing, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.S.) 96
Business Administration and Nursing, Master of Business Administration and Doctor of Philosophy (dual degree) (M.B.A. and Ph.D.) 96
Business Administration and Nursing (BNRS) 97
Business Administration (Online), Master of Business Administration (M.B.A.) 97
Business Administration (online) (OMBA) 97
Business Administration and Pharmacy, Master of Business Administration and Doctor of Pharmacy (Dual Degree) (M.B.A. and Pharm.D.) 99
Business Administration and Pharmacy (BPHR) 99
Business Administration and Public Policy, Master of Business Administration and Master of Public Policy (Dual Degree) (M.B.A. and M.P.P.) 100
Business Administration and Public Policy (BMPO) 100
Business Administration and Real Estate Development, Master of Business Administration and Master of Real Estate Development (Dual Degree) (M.B.A. and M.R.E.D.) 101

Business Administration and Real Estate Development (MBRE) 102
Business Administration and Social Work, Master of Business Administration and Master of Social Work (Dual Degree) (M.B.A. and M.S.W.) 102
Business Administration and Social Work (BMSW) 103
Business Administration and Supply Chain Management 104
Business Administration and Supply Chain Management (BASC) 104
Business Analytics, Master of Science (M.S.) 105
Business Analytics (BMAN) 105
Business and Management, Master of Science (M.S.) 106
Business and Management (BMSB) 106
Business and Management, Doctor of Philosophy (Ph.D.) 106
Business and Management (BPHD) 107
Business Management and Law, Master of Business Administration and Juris Doctorate (Dual Degree) (M.B.A. and J.D.) 108
Business Management and Law (LMBA) 108
Chemical and Biomolecular Engineering, Master of Engineering (M.Eng.) 109
Chemical and Biomolecular Engineering (PMCH) 109
Chemical and Biomolecular Engineering, Post-Baccalaureate Certificate (P.B.C.) 110
Chemical and Biomolecular Engineering (Z055) 110
Chemical Engineering, Master of Science (M.S.) 111
Chemical Engineering, Doctor of Philosophy (Ph.D.) 111
Chemical Engineering (ENCH) 112
Chemical and Life Sciences, Master of Chemical and Life Sciences (M.C.L.F.S.) 113
Chemical and Life Sciences (CLFS) 113
Chemical Physics, Master of Science (M.S.) 114
Chemical Physics, Doctor of Philosophy (Ph.D.) 114
Chemical Physics (CHPH) 115
Chemistry, Master of Science (M.S.) 116
Chemistry, Doctor of Philosophy (Ph.D.) 116
Chemistry (CHEM) 117
Civil and Environmental Engineering, Master of Science (M.S.) 118
Civil and Environmental Engineering, Doctor of Philosophy (Ph.D.) 118
Civil and Environmental Engineering (ENCE) 119
Civil and Environmental Engineering, Master of Engineering (M.Eng.) 120
Civil and Environmental Engineering (PMCE) 120
Civil and Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.) 121
Civil and Environmental Engineering (Z056) 122
Classics, Master of Arts (M.A.) 122
Classics (CLAS) 123
Clinical Audiology, Doctor of Audiology (Au.D.) 124
Clinical Audiology, Combined Doctor of Audiology and Doctor of Philosophy (Au.D./Ph.D.) 124
Clinical Audiology (CAUD) 125
Clinical Psychological Science, Master of Professional Studies (M.P.S.) 126
Clinical Psychological Science (MPPS) 127
Communication, Master of Arts (M.A.) 127
Communication, Doctor of Philosophy (Ph.D.) 127
Communication (COMM) 128
Communication Management, Post-Baccalaureate Certificate (P.B.C.) 129
Communication Management (Z045) 129
Community Counseling, Master of Arts (M.A.) 129
Community Counseling, Master of Education (M.Ed.) 130
Community Counseling (COCM) 130
Community Planning, Master of Community Planning (M.C.P.) 130
Community Planning (CMPL) 130
Community Planning and Historic Preservation, Master of Community Planning and Master of Historic Preservation (dual degree) (M.C.P. and M.H.P.) 131
Community Planning and Historic Preservation (CPHP) 132
Community Planning and Law, Master of Community Planning and Juris Doctorate (Dual Degree) (M.C.P. and J.D.) 133
Community Planning and Law (LCPL) 133
Comparative Literature, Doctor of Philosophy (Ph.D.) 134
Comparative Literature (CMLT) 134
Computational Harmonic Analysis, Post-Baccalaureate Certificate (P.B.C.) 135
Computational Harmonic Analysis (Z023) 135
Computational Methods in Atmospheric & Oceanic Science, Post-Baccalaureate Certificate (P.B.C.) 136
Computational Methods in Atmospheric & Oceanic Science (Z048) 136
Computer Networking, Post-Baccalaureate Certificate (P.B.C.) 136
Computer Networking (Z117) 136
Computer Science, Master of Science (M.S.) 137
Computer Science, Doctor of Philosophy (Ph.D.) 137
Computer Science (CMSC) 137
Computing Systems, Post-Baccalaureate Certificate (P.B.C.) 138
Computing Systems (Z118) 138

Consecutive Interpreting, Post-Baccalaureate Certificate (P.B.C.) 139
Consecutive Interpreting (Z080) 139
Corporate Innovation, Master of Professional Studies (M.P.S.) 140
Corporate Innovation (MPCI) 140
Counseling & Personnel Services, Certificate of Advanced Study (C.A.S.) 141
Counseling & Personnel Services (Z901) 141
Counseling Psychology, Master of Arts (M.A.) 141
Counseling Psychology, Doctor of Philosophy (Ph.D.) 141
Counseling Psychology (COCP) 142
Couple and Family Therapy, Master of Science (M.S.) 144
Couple and Family Therapy (FCFT) 144
Creative Writing, Master of Fine Arts (M.F.A.) 145
Creative Writing (CRWR) 146
Criminology and Criminal Justice, Master of Arts (M.A.) 147
Criminology and Criminal Justice (CJCH) 147
Criminology and Criminal Justice, Master of Arts (M.A.) 148
Criminology and Criminal Justice, Doctor of Philosophy (Ph.D.) 148
Criminology and Criminal Justice (CRIM) 148
Critical Theory, Post-Baccalaureate Certificate (P.B.C.) 149
Critical Theory (Z017) 149
Cultural and Heritage Resource Management, Master of Professional Studies (M.P.S.) 150
Cultural and Heritage Resource Management (MPCH) 150
Cultural and Heritage Resource Management, Post-Baccalaureate Certificate (P.B.C.) 151
Cultural and Heritage Resource Management (Z121) 151
Curation and Management of Digital Assets, Post-Masters Certificate (P.M.C.) 151
Curation and Management of Digital Assets (online) (Z093) 152
Curriculum and Instruction, Master of Arts (M.A.) 153
Curriculum and Instruction, Master of Education (M.Ed.) 153
Curriculum and Instruction, Post-Baccalaureate Certificate (P.B.C.) 153
Curriculum and Instruction (EDCI) 153
Curriculum and Instruction, Certificate of Advanced Study (C.A.S.) 155
Curriculum and Instruction (Z902) 155
Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.) 155
Cybersecurity Engineering (online) (Z092) 155
Cybersecurity Engineering, Master of Engineering (M.Eng.) 156
Cybersecurity Engineering (PMCY) 156
Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.) 157
Cybersecurity Engineering (Z073) 158
Cybersecurity Leadership, Post-Baccalaureate Certificate (P.B.C.) 159
Cybersecurity Leadership (Z077) 159
Cybersecurity, Master of Engineering (M.Eng.) 159
Cybersecurity (online) (MECY) 159
Dance, Master of Fine Arts (M.F.A.) 160
Dance (DANC) 161
Data Science, Post-Baccalaureate Certificate (P.B.C.) 162
Data Science (Z104) 162
Digital Studies, Post-Baccalaureate Certificate (P.B.C.) 163
Digital Studies (Z110) 163
Ecological Economics, Post-Baccalaureate Certificate (P.B.C.) 163
Ecological Economics (Z009) 164
Economic Analysis, Post-Baccalaureate Certificate (P.B.C.) 164
Economic Analysis (off-campus) (Z074) 164
Economic Analysis, Post-Baccalaureate Certificate (P.B.C.) 165
Economic Analysis (on-campus) (Z098) 165
Economics, Master of Arts (M.A.) 166
Economics, Doctor of Philosophy (Ph.D.) 166
Economics (ECON) 167
Ecosystems Restoration, Post-Baccalaureate Certificate (P.B.C.) 168
Ecosystems Restoration (Z041) 168
Electrical and Computer Engineering, Master of Science (M.S.) 168
Electrical and Computer Engineering, Doctor of Philosophy (Ph.D.) 168
Electrical and Computer Engineering (ENEE) 168
Electrical and Computer Engineering, Master of Engineering (M.Eng.) 170
Electrical and Computer Engineering (PMEE) 171
Electrical and Computer Engineering, Post-Baccalaureate Certificate (P.B.C.) 172
Electrical and Computer Engineering (Z057) 172
Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.) 173
Electronic Packaging (online) (Z111) 173
Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.) 174
Electronic Packaging (Z112) 174
Elementary and Middle School Science Education, Post-Baccalaureate Certificate (P.B.C.) 175
Elementary & Middle School Science Education (Z051) 175

Energetic Concepts Engineering, Master of Engineering (M.Eng.) 175
Energetic Concepts Engineering (online) (MEEC) 175
Energetic Concepts Engineering, Post-Baccalaureate Certificate (P.B.C.) 175
Energetic Concepts Engineering (online) (Z072) 175
Energy Systems Engineering, Master of Engineering (M.Eng.) 175
Energy Systems Engineering (online) (MEEE) 176
Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) 177
Energy Systems Engineering (online) (Z082) 177
Energy Systems Engineering, Master of Engineering (M.Eng.) 178
Energy Systems Engineering (PMSU) 178
Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) 179
Energy Systems Engineering (Z066) 179
Energy Systems Management and Policy, Post-Baccalaureate Certificate (P.B.C.) 180
Energy Systems Management and Policy (Z107) 180
Engineering and Public Policy, Master of Engineering and Public Policy (M.Eng.Pub.Pol.) 180
Engineering and Public Policy (MEPP) 180
English Language and Literature, Master of Arts (M.A.) 181
English Language and Literature, Doctor of Philosophy (Ph.D.) 181
English Language and Literature (ENGL) 182
Entomology, Master of Science (M.S.) 183
Entomology, Doctor of Philosophy (Ph.D.) 183
Entomology (ENTM) 183
Environmental Engineering, Master of Engineering (M.Eng.) 185
Environmental Engineering (PMEN) 185
Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.) 186
Environmental Engineering (Z058) 186
Environmental Health Sciences, Master of Science (M.S.) 187
Environmental Health Sciences, Doctor of Philosophy (Ph.D.) 188
Environmental Health Sciences (ENVH) 188
Environmental Health Sciences, Master of Public Health (M.P.H.) 189
Environmental Health Sciences (MIEH) 189
Environmental Policy, Post-Baccalaureate Certificate (P.B.C.) 191
Environmental Policy (EPOL) 191
Environmental Policy, Post-Baccalaureate Certificate (P.B.C.) 191
Environmental Policy (Z008) 191
Environmental Science and Technology, Master of Science (M.S.) 191
Environmental Science and Technology, Doctor of Philosophy (Ph.D.) 192
Environmental Science and Technology (ENST) 192
Epidemiology, Master of Public Health (M.P.H.) 193
Epidemiology (EPDM) 194
Epidemiology, Doctor of Philosophy (Ph.D.) 195
Epidemiology (EPID) 195
Ethnomusicology, Master of Arts (M.A.) 196
Ethnomusicology, Doctor of Philosophy (Ph.D.) 196
Ethnomusicology (MUET) 197
Executive Public Policy, Master of Public Management (M.P.M.) 198
Executive Public Policy (EXPM) 198
Family Science, Master of Science (M.S.) 199
Family Science, Doctor of Philosophy (Ph.D.) 199
Family Science (FMSC) 199
Finance, Master of Finance (M.Fin.) 200
Finance (BMFN) 201
Fire Protection Engineering, Master of Science (M.S.) 201
Fire Protection Engineering (ENFP) 202
Fire Protection Engineering, Master of Engineering (M.Eng.) 203
Fire Protection Engineering (online) (ENGF) 203
Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.) 204
Fire Protection Engineering (online) (Z049) 204
Fire Protection Engineering, Master of Engineering (M.Eng.) 205
Fire Protection Engineering (PMFP) 206
Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.) 206
Fire Protection Engineering (Z059) 207
Food Safety Risk Assessment, Post-Baccalaureate Certificate (P.B.C.) 207
Food Safety Risk Assessment (Z027) 207
French Modern Studies, Doctor of Philosophy (Ph.D.) 208
Modern French Studies (FRMS) 208
French Studies, Master of Arts (M.A.) 209
French Studies (FRIT) 209
Geographical Science, Master of Science (M.S.) 210
Geographical Sciences, Doctor of Philosophy (Ph.D.) 210
Geographical Sciences (GEOG) 210
Geology, Master of Science (M.S.) 213
Geology, Doctor of Philosophy (Ph.D.) 213
Geology (GEOL) 213

Geospatial Information Science, Master of Professional Studies (M.P.S.) 214
Geospatial Information Science (MPGC) 215
Geospatial Information Sciences, Master of Professional Studies (M.P.S.) 215
Geospatial Information Sciences (MPGS) 215
Geospatial Information Sciences, Post-Baccalaureate Certificate (P.B.C.) 215
Geospatial Information Sciences (Z035) 215
Geospatial Intelligence, Master of Professional Studies (M.P.S.) 216
Geospatial Intelligence (MPGI) 217
Geospatial Intelligence, Post-Baccalaureate Certificate (P.B.C.) ... 217
Geospatial Intelligence (Z109) 217
German Literature and Language, Master of Arts (M.A.) 218
German Literature and Language, Doctor of Philosophy (Ph.D.) 218
German Literature and Language (GERS) 218
Gerontology, Post-Baccalaureate Certificate (P.B.C.) 219
Gerontology (doctoral level) (Z101) 219
Gerontology, Post-Baccalaureate Certificate (P.B.C.) 220
Gerontology (master's level) (Z100) 220
Global Health, Post-Baccalaureate Certificate (P.B.C.) 221
Global Health (Z070) 221
Government and Politics, Master of Arts (M.A.) 222
Government and Politics, Doctor of Philosophy (Ph.D.) 222
Government and Politics (GVPT) 222
Government and the Private Economy, Post-Baccalaureate Certificate (P.B.C.) 223
Government & The Private Economy (Z002) 223
Health Administration, Master of Health Administration (M.H.A.) 224
Health Administration (HLSA) 224
Health Equity, Master of Public Health (M.P.H.) 224
Health Equity (HLEQ) 225
Health Policy Analysis and Evaluation, Master of Public Health (M.P.H.) 226
Health Policy Analysis and Evaluation (HPAE) 226
Health Services, Doctor of Philosophy (Ph.D.) 227
Health Services (PHHS) 228
Hearing and Speech Sciences, Doctor of Audiology (Au.D.) 229
Hearing and Speech Sciences, Master of Arts (M.A.) 229
Hearing and Speech Sciences, Doctor of Philosophy (Ph.D.) 229
Hearing and Speech Sciences (HESP) 229
Higher Education, Master of Arts (M.A.) 231
Higher Education, Doctor of Philosophy (Ph.D.) 231
Higher Education (HIED) 231
Historic Preservation, Master of Historic Preservation (M.H.P.) 233
Historic Preservation (HISP) 233
Historic Preservation and Real Estate Development, Master of Historic Preservation and Master of Real Estate Development (dual degree) (M.H.P. and M.R.E.D.) 235
Historic Preservation and Real Estate Development (HPDV) 235
Historic Preservation, Post-Baccalaureate Certificate (P.B.C.) 237
Historic Preservation (Z005) 237
History, Master of Arts (M.A.) 238
History, Doctor of Philosophy (Ph.D.) 238
History (HIST) 239
History and Library & Information Science, Master of Arts and Master of Library and Information Science (dual degree) (M.A. and M.L.I.S.) 241
History and Library & Information Science (HILS) 241
Housing, Finance & Development, Post-Baccalaureate Certificate (P.B.C.) 242
Housing, Finance & Development (Z007) 242
Human-Computer Interaction, Master of Science (M.S.) 243
Human-Computer Interaction (HCIM) 243
Human Development, Master of Arts (M.A.) 244
Human Development, Master of Education (M.Ed.) 244
Human Development, Doctor of Philosophy (Ph.D.) 245
Human Development (EDHD) 245
Human Development Education, Certificate of Advanced Study (C.A.S.) 247
Human Development Education (Z903) 247
Industrial/Organizational Psychology (MPIO) 247
Industrial/Organizational Psychology, Master of Professional Studies (M.P.S.) 248
Information Assurance Management (Z026) 249
Information Assurance Management, Post-Baccalaureate Certificate (P.B.C.) 249
Information Management (INFM) 249
Information Management, Master of Information Management (M.I.M.) 250
Information Management (online) (MIMO) 251
Information Management, Master of Information Management (M.I.M.) 252
Information Studies (INFS) 252
Information Studies, Doctor of Philosophy (Ph.D.) 253
Information Systems (BMIS) 253

Information Systems, Master of Science (M.S.) 254
Integrated Pest Management (Z089) 254
Integrated Pest Management, Post-Baccalaureate Certificate (P.B.C.) 255
Intelligence Analysis (Z021) 255
Intelligence Analysis, Post-Baccalaureate Certificate (P.B.C.) 256
Intermediate Survey Methodology (Z011) 256
Intermediate Survey Methodology, Post-Baccalaureate Certificate in Intermediate Survey Methodology (P.B.C.) 256
International Education Policy (HIEP) 256
International Education Policy, Master of Arts (M.A.) 257
International Education Policy, Doctor of Philosophy (Ph.D.) 258
Interpreting (MPIN) 258
Interpreting, Master of Professional Studies (M.P.S.) 258
Jewish Studies (JWST) 259
Jewish Studies, Master of Arts (M.A.) 260
Jewish Studies (Z018) 260
Jewish Studies, Post-Baccalaureate Certificate (P.B.C.) 260
Journalism (JOMJ) 261
Journalism, Master of Journalism (M.J.) 261
Journalism (JOST) 262
Journalism, Doctor of Philosophy (Ph.D.) 263
Journalism (JOUR) 263
Journalism, Master of Arts (M.A.) 264
Justice Leadership (MPJL) 264
Justice Leadership, Master of Professional Studies (M.P.S.) 265
Kinesiology (KNES) 265
Kinesiology, Master of Arts (M.A.) 267
Kinesiology, Doctor of Philosophy (Ph.D.) 267
Landscape Architecture and Community Planning (LACP) 267
Landscape Architecture and Community Planning, Master of Landscape Architecture and Master of Community Planning (dual degree) (M.L.A. and M.C.P.) 268
Landscape Architecture (LARC) 269
Landscape Architecture, Master of Landscape Architecture (M.L.A.) 270
Leadership Education & Development (MPLD) 271
Leadership Education & Development, Master of Professional Studies (M.P.S.) 271
Library and Information Science (LBSC) 271
Library and Information Science, Master of Library and Information Science (M.L.I.S.) 272
Library and Information Science (online) (LBSO) 273
Library and Information Science, Master of Library and Information Science (M.L.I.S.) 274
Linguistics (LING) 274
Linguistics, Master of Arts (M.A.) 276
Linguistics, Doctor of Philosophy (Ph.D.) 276
Literacy Coaching (Z038) 277
Literacy Coaching, Post-Baccalaureate Certificate (P.B.C.) 278
Marine, Estuarine, and Environmental Sciences (MEES) 278
Marine, Estuarine, and Environmental Sciences, Master of Science (M.S.) 279
Marine, Estuarine, and Environmental Sciences, Doctor of Philosophy (Ph.D.) 280
Marketing Analytics (BMMA) 280
Marketing Analytics, Master of Science (M.S.) 281
Materials Science and Engineering (ENMA) 281
Materials Science and Engineering, Master of Science (M.S.) 283
Materials Science and Engineering, Doctor of Philosophy (Ph.D.) 283
Materials Science and Engineering (PMMS) 283
Materials Science and Engineering, Master of Engineering (M.Eng.) 284
Materials Science and Engineering (Z060) 284
Materials Science and Engineering, Post-Baccalaureate Certificate (P.B.C.) 285
Maternal and Child Health (MCHS) 285
Maternal and Child Health, Doctor of Philosophy (Ph.D.) 286
Mathematical Statistics (STAT) 287
Mathematical Statistics, Master of Arts (M.A.) 288
Mathematical Statistics, Doctor of Philosophy (Ph.D.) 288
Mathematics of Advanced Industrial Technology (MAIT) 289
Mathematics of Advanced Industrial Technology, Master of Mathematics of Advanced Industrial Technology (M.M.A.I.T.) 289
Mathematics of Advanced Industrial Technology (Z022) 289
Mathematics of Advanced Industrial Technology, Post-Baccalaureate Certificate (P.B.C.) 290
Mathematics (MATH) 290
Mathematics, Master of Arts (M.A.) 291
Mathematics, Doctor of Philosophy (Ph.D.) 291
Measurement, Statistics and Evaluation (EDMS) 292
Measurement, Statistics and Evaluation, Certificate of Advanced Study (C.A.S.) 293
Measurement, Statistics and Evaluation, Master of Arts (M.A.) 293
Measurement, Statistics and Evaluation, Master of Education (M.Ed.) 293

Measurement, Statistics and Evaluation, Doctor of Philosophy (Ph.D.) 293
Measurement, Statistics & Evaluation (Z019) 294
Measurement, Statistics & Evaluation, Post-Baccalaureate Certificate (P.B.C.) 294
Mechanical Engineering (ENME) 294
Mechanical Engineering, Master of Science (M.S.) 296
Mechanical Engineering, Doctor of Philosophy (Ph.D.) 296
Mechanical Engineering (PMME) 297
Mechanical Engineering, Master of Engineering (M.Eng.) 297
Mechanical Engineering (Z061) 298
Mechanical Engineering, Post-Baccalaureate Certificate (P.B.C.) 299
Methods of Public Analysis (Z001) 299
Methods of Public Analysis, Post-Baccalaureate Certificate (P.B.C.) 300
MSDE Administrator I Certification (Z052) 300
MSDE Administrator I Certification, Post-Baccalaureate Certificate (P.B.C.) 300
Multimedia Journalism (Z071) 300
Multimedia Journalism, Post-Baccalaureate Certificate (P.B.C.) 300
Museum Scholarship & Material Culture (Z016) 301
Museum Scholarship & Material Culture, Post-Baccalaureate Certificate (P.B.C.) 301
Music Education (MUED) 301
Music Education, Master of Arts (M.A.) 303
Music Education, Master of Music (M.Mus.) 303
Music Education, Doctor of Philosophy (Ph.D.) 303
Music (MUSA) 303
Music, Master of Arts (M.A.) 305
Music, Doctor of Philosophy (Ph.D.) 305
Music (MUSC) 306
Music, Doctor of Musical Arts (D.M.A.) 307
Music, Master of Music (M.Mus.) 310
National Security Studies (Z003) 311
National Security Studies, Post-Baccalaureate Certificate (P.B.C.) 311
Networking Software Development (Z119) 311
Networking Software Development, Post-Baccalaureate Certificate (P.B.C.) 311
Neuroscience and Cognitive Sciences (Z037) 312
Neuroscience and Cognitive Sciences, Post-Baccalaureate Certificate (P.B.C.) 312
Neurosciences and Cognitive Science (NACS) 312
Neurosciences and Cognitive Science, Master of Science (M.S.) 313
Neurosciences and Cognitive Science, Doctor of Philosophy (Ph.D.) 314
Nonprofit Management and Leadership (Z116) 314
Nonprofit Management and Leadership, Post-Baccalaureate Certificate (P.B.C.) 315
Nuclear Engineering (ENNU) 315
Nuclear Engineering, Master of Science (M.S.) 315
Nuclear Engineering, Doctor of Philosophy (Ph.D.) 315
Nuclear Engineering (online) (MENU) 315
Nuclear Engineering, Master of Engineering (M.Eng.) 315
Nuclear Engineering (online) (Z050) 315
Nuclear Engineering, Post-Baccalaureate Certificate (P.B.C.) 315
Nuclear Engineering (PMNU) 315
Nuclear Engineering, Master of Engineering (M.Eng.) 315
Nuclear Engineering (Z062) 315
Nuclear Engineering, Post-Baccalaureate Certificate (P.B.C.) 315
Nutrition and Food Science (NFSC) 315
Nutrition and Food Science, Master of Science (M.S.) 316
Nutrition and Food Science, Doctor of Philosophy (Ph.D.) 317
Organic and Sustainable Agriculture (Z090) 317
Organic and Sustainable Agriculture, Post-Baccalaureate Certificate (P.B.C.) 318
Performance (MFAP) 318
Performance, Master of Fine Arts (M.F.A.) 318
Philosophy (PHIL) 319
Philosophy, Master of Arts (M.A.) 319
Philosophy, Doctor of Philosophy (Ph.D.) 319
Physical Activity (PHAC) 320
Physical Activity, Master of Public Health (M.P.H.) 321
Physics (PHYS) 321
Physics, Master of Science (M.S.) 322
Physics, Doctor of Philosophy (Ph.D.) 322
Plant Science (PLSC) 323
Plant Science, Master of Science (M.S.) 324
Plant Science, Doctor of Philosophy (Ph.D.) 325
Policy Studies (EDPS) 325
Policy Studies, Master of Arts (M.A.) 325
Policy Studies (POSI) 325
Policy Studies, Doctor of Philosophy (Ph.D.) 326
Population Studies (Z036) 326
Population Studies, Post-Baccalaureate Certificate (P.B.C.) 327

Principles of Public Health (Z076) 327
Principles of Public Health, Post-Baccalaureate Certificate (P.B.C.) 329
Professional Communication for Enhanced English Fluency (online) (Z106) 329
Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.) 329
Professional Communication for Enhanced English Fluency (Z105) 330
Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.) 330
Project Management (online) (MEPM) 330
Project Management, Master of Engineering (M.Eng.) 331
Project Management (online) (Z040) 332
Project Management, Post-Baccalaureate Certificate (P.B.C.) 332
Project Management (PMPM) 333
Project Management, Master of Engineering (M.Eng.) 334
Project Management (Z063) 334
Project Management, Post-Baccalaureate Certificate (P.B.C.) 335
Psychology (PSYC) 335
Psychology, Master of Science (M.S.) 336
Psychology, Doctor of Philosophy (Ph.D.) 336
Public Administration (MPPA) 337
Public Administration, Master of Professional Studies (M.P.S.) 337
Public Financial Management (Z094) 338
Public Financial Management, Post-Baccalaureate Certificate (P.B.C.) 338
Public Health Informatics (Z028) 338
Public Health Informatics, Post-Baccalaureate Certificate (P.B.C.) 339
Public Health Practice and Policy (PHPP) 339
Public Health Practice and Policy, Master of Public Health (M.P.H.) 340
Public Management (MAMG) 340
Public Management, Master of Public Management (M.P.M.) 341
Public Management (Z004) 341
Public Management, Post-Baccalaureate Certificate (P.B.C.) 341
Public Policy and Law (LMPO) 342
Public Policy and Law, Master of Public Policy and Juris Doctorate (dual degree) (M.P.P. and J.D.) 342
Public Policy (MAPO) 343
Public Policy, Master of Public Policy (M.P.P.) 343
Public Policy and Sustainable Development & Conservation Biology (PPCN) 344
Public Policy and Sustainable Development & Conservation Biology, Master of Public Policy and Master of Science (dual degree) (M.P.P. and M.S.) 345
Public Sector Finance & Acquisition (Z033) 345
Public Sector Finance & Acquisition, Post-Baccalaureate Certificate (P.B.C.) 345
Quantitative Finance (BMQF) 345
Quantitative Finance, Master of Quantitative Finance (M.Q.F.) 346
Radar Signal Processing (Z031) 346
Radar Signal Processing, Post-Baccalaureate Certificate (P.B.C.) 346
Real Estate Development (MPRE) 346
Real Estate Development, Master of Professional Studies (M.P.S.) 347
Real Estate Development (RDEV) 347
Real Estate Development, Master of Real Estate Development (M.R.E.D.) 349
Real Estate Development (Z029) 350
Real Estate Development, Post-Baccalaureate Certificate (P.B.C.) 351
Regulatory Science and Engineering (Z087) 351
Regulatory Science and Engineering, Post-Baccalaureate Certificate (P.B.C.) 351
Reliability Engineering (ENRE) 351
Reliability Engineering, Master of Science (M.S.) 353
Reliability Engineering, Doctor of Philosophy (Ph.D.) 353
Reliability Engineering (online) (MERE) 353
Reliability Engineering, Master of Engineering (M.Eng.) 354
Reliability Engineering (online) (Z042) 354
Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.) 355
Reliability Engineering (PMRE) 355
Reliability Engineering, Master of Engineering (M.Eng.) 356
Reliability Engineering (Z064) 356
Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.) 357
Risk, Compliance, and the Law (Z108) 358
Risk, Compliance, and the Law, Post-Baccalaureate Certificate (P.B.C.) 358
Robotics Engineering (Z084) 358
Robotics Engineering, Post-Baccalaureate Certificate (P.B.C.) 359
Robotics (PMRO) 360
Robotics, Master of Engineering (M.Eng.) 361
School Counseling (COSC) 361
School Counseling, Master of Education (M.Ed.) 362
School Librarianship (Z114) 362
School Librarianship, Post-Baccalaureate Certificate (P.B.C.) 363

School Psychology (COSP) 363
School Psychology, Certificate of Advanced Study (C.A.S.) 365
School Psychology, Master of Arts (M.A.) 365
School Psychology, Doctor of Philosophy (Ph.D.) 365
School System Leadership (EDUC) 366
School System Leadership, Doctor of Education (Ed.D.) 366
Scientific Computation (Z014) 367
Scientific Computation, Post-Baccalaureate Certificate (P.B.C.) ... 367
Second Language Acquisition (SLMA) 367
Second Language Acquisition, Master of Arts (M.A.) 368
Second Language Acquisition (SLPH) 368
Second Language Acquisition, Doctor of Philosophy (Ph.D.) 369
Second Language Acquisition (Z081) 370
Second Language Acquisition, Post-Baccalaureate Certificate (P.B.C.) 370
Sociology (SOCY) 371
Sociology, Master of Arts (M.A.) 372
Sociology, Doctor of Philosophy (Ph.D.) 372
Software Engineering (PMES) 372
Software Engineering, Master of Engineering (M.Eng.) 373
Software Engineering (Z065) 373
Software Engineering, Post-Baccalaureate Certificate (P.B.C.) 374
Spanish Language and Literature (SPAP) 374
Spanish Language and Literature, Master of Arts (M.A.) 376
Spanish Language and Literature, Doctor of Philosophy (Ph.D.) 377
Special Education (EDSP) 377
Special Education, Certificate of Advanced Study (C.A.S.) 378
Special Education, Master of Arts (M.A.) 378
Special Education, Master of Education (M.Ed.) 379
Special Education, Doctor of Philosophy (Ph.D.) 380
Special Education (Z905) 380
Special Education, Certificate of Advanced Study (C.A.S.) 381
Speech Language Pathology (SPLA) 381
Speech Language Pathology, Master of Arts (M.A.) 382
Student Affairs (HISA) 383
Student Affairs, Master of Arts (M.A.) 384
Student Affairs, Master of Education (M.Ed.) 385
Student Affairs, Doctor of Philosophy (Ph.D.) 385
Supply Chain Management (BMSC) 385
Supply Chain Management, Master of Science (M.S.) 386
Survey and Data Science (online) (MPDS) 386
Survey and Data Science, Master of Professional Studies (M.P.S.) 387
Survey Methodology (SURV) 388
Survey Methodology, Master of Science (M.S.) 389
Survey Methodology, Doctor of Philosophy (Ph.D.) 389
Survey Statistics (Z010) 389
Survey Statistics, Post-Baccalaureate Certificate (P.B.C.) 389
Sustainable Development and Conservation Biology (CONS) 389
Sustainable Development and Conservation Biology, Master of Science (M.S.) 390
Systems Engineering (ENSE) 390
Systems Engineering, Master of Science (M.S.) 391
Systems Engineering (PMSE) 392
Systems Engineering, Master of Engineering (M.Eng.) 393
Systems Engineering (Z067) 393
Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) 394
Teaching English to Speakers of Other Languages (Z099) 394
Teaching English to Speakers of Other Languages, Post-Baccalaureate Certificate (P.B.C.) 395
Teaching and Learning, Policy and Leadership (TLPL) 395
Teaching and Learning, Policy and Leadership, Master of Arts (M.A.) 396
Teaching and Learning, Policy and Leadership, Doctor of Philosophy (Ph.D.) 396
Technology Entrepreneurship (MPTE) 396
Technology Entrepreneurship, Master of Professional Studies (M.P.S.) 397
Technology Ventures and Innovation (Z068) 397
Technology Ventures and Innovation, Post-Baccalaureate Certificate (P.B.C.) 398
Telecommunications (ENTS) 398
Telecommunications, Master of Science (M.S.) 398
Terrorism Analysis (Z039) 399
Terrorism Analysis, Post-Baccalaureate Certificate (P.B.C.) 400
Theatre Design (MFAT) 400
Theatre Design, Master of Fine Arts (M.F.A.) 401
Theatre and Performance Studies (THPF) 402
Theatre and Performance Studies, Master of Arts (M.A.) 403
Theatre and Performance Studies, Doctor of Philosophy (Ph.D.) 403
Toxicology (TOXI) 404
Toxicology and Environmental Health, Doctor of Philosophy (Ph.D.) 404
Toxicology, Master of Science (M.S.) 404
Translation (MPTR) 404

Translation, Master of Professional Studies (M.P.S.) 405
Translation (Z079) 405
Translation, Post-Baccalaureate Certificate (P.B.C.) 406
Transportation Policy and Planning (Z030) 406
Transportation Policy and Planning, Post-Baccalaureate Certificate (P.B.C.) 407
Transportation Systems (online) (METS) 407
Transportation Systems, Master of Engineering (M.Eng.) 407
Transportation Systems (online) (Z102) 407
Transportation Systems, Post-Baccalaureate Certificate (P.B.C.) 407
Urban Agriculture (Z091) 407
Urban Agriculture, Post-Baccalaureate Certificate (P.B.C.) 407
Urban Design (Z012) 408
Urban Design, Post-Baccalaureate Certificate (P.B.C.) 408
Urban and Regional Planning and Design (URPD) 408
Urban and Regional Planning and Design, Doctor of Philosophy (Ph.D.) 409
Veterinary Medical Sciences (VMSC) 409
Veterinary Medical Sciences, Master of Science (M.S.) 410
Veterinary Medical Sciences, Doctor of Philosophy (Ph.D.) 411
Veterinary Medicine (VMED) 411
Veterinary Medicine, Doctor of Veterinary Medicine (D.V.M.) 412
Wireless Communications (Z120) 412
Wireless Communications, Post-Baccalaureate Certificate (P.B.C.) 413
Women's Studies (WMST) 413
Women's Studies, Master of Arts (M.A.) 414
Women's Studies, Doctor of Philosophy (Ph.D.) 414
Women's Studies (Z006) 414
Women's Studies, Post-Baccalaureate Certificate (P.B.C.) 415
World Languages Education (Z095) 415
World Languages Education, Post-Baccalaureate Certificate (P.B.C.) 415
Youth Experience (Z113) 415
Youth Experience, Post-Baccalaureate Certificate (P.B.C.) 416
Faculty Listing 417
Course Listing 593
AASP - African American Studies 595
AAST - Asian American Studies 596
AGNR - Agriculture and Natural Resources 596
AMSC - Applied Mathematics & Scientific Computation 597
AMST - American Studies 599
ANSC - Animal Science 600
ANTH - Anthropology 602
AOSC - Atmospheric and Oceanic Science 609
ARAB - Arabic 614
ARCH - Architecture 614
AREC - Agricultural and Resource Economics 619
ARHU - Arts and Humanities 622
ARMY - Army 623
ARSC - Air Science 623
ARTH - Art History & Archaeology 623
ARTT - Art Studio 625
ASTR - Astronomy 626
BCHM - Biochemistry 628
BEES - Behavior, Ecology, Evolution and Systematics 629
BERC - Ctr for Stdy of Busns,Ethics,Regulatn,Crime 629
BIOE - Bioengineering 630
BIOL - Biology 634
BIOM - Biometrics 635
BIPH - Biophysics 636
BISI - Biological Sciences 636
BMGT - Business and Management 636
BSCI - Biological Sciences Program 644
BSOS - Behavioral and Social Sciences 647
BSST - Terrorism Studies 647
BUDT - Decision and Information Technologies 648
BUFN - Finance 650
BULM - Logistics, Business, and Public Policy 655
BUMK - Marketing 657
BUMO - Management and Organization 660
BUSI - Part-Time MBA Program 662
BUSM - Full-Time MBA Program 668
CBMG - Cell Biology & Molecular Genetics 674
CCJS - Criminology and Criminal Justice 674
CHBE - Chemical and Biomolecular Engineering 677
CHEM - Chemistry 682
CHIN - Chinese 683
CHPH - Chemical Physics 685
CLAS - Classics 685
CLFS - Chemical and Life Sciences 685
CMLT - Comparative Literature 686
CMSC - Computer Science 687
COMM - Communication 695

CONS - Sustainable Development & Conservation Biology 702
DANC - Dance 702
ECON - Economics 704
EDCI - Curriculum and Instruction 714
EDCP - Education Counseling and Personnel Services 716
EDHD - Education, Human Development 721
EDHI - Education Leadership, Higher Ed and International Ed 727
EDMS - Measurement, Statistics, and Evaluation 730
EDPS - Education Policy Studies 732
EDSP - Education, Special 732
EDUC - Education 740
EMBA - Executive MBA Program 741
ENAE - Engineering, Aerospace 744
ENBE - Biological Resources Engineering 749
ENCE - Engineering, Civil 749
ENCH - Engineering, Chemical 755
ENEE - Electrical & Computer Engineering 757
ENES - Engineering Science 765
ENFP - Engineering, Fire Protection 768
ENGL - English 771
ENMA - Engineering, Materials 778
ENME - Engineering, Mechanical 786
ENNU - Engineering, Nuclear 794
ENPM - Engineering, Professional Masters 795
ENPP - Engineering and Public Policy 801
ENRE - Reliability Engineering 801
ENSE - Systems Engineering 803
ENSP - Environmental Science and Policy 804
ENST - Environmental Science and Technology 805
ENTM - Entomology 810
ENTS - Telecommunications 811
EPIB - Epidemiology and Biostatistics 813
FILM - Film Studies 817
FMSC - Family Science 818
FOLA - Foreign Language 822
FREN - French 822
GEOG - Geographical Sciences 824
GEOL - Geology 832
GERM - Germanic Studies 837
GREK - Greek 839
GVPT - Government and Politics 839
HACS - ACES-Cybersecurity 845
HEBR - Hebrew 845
HESI - Higher Ed, Student Affairs, and International Ed Policy 845
HESP - Hearing and Speech Sciences 846
HISP - Historic Preservation 852
HIST - History 853
HLHP - Health and Human Performance 858
HLMN - Hillman Entrepreneurs Program 858
HLSA - Health Services Administration 858
HLTH - Health 862
IMMR - Immigration Studies 865
INFM - Information Management 865
INST - Information Studies 867
ISRL - Israel Studies 877
ITAL - Italian 878
JAPN - Japanese 878
JOUR - Journalism 879
JWST - Jewish Studies 884
KNES - Kinesiology 886
KORA - Korean 890
LARC - Landscape Architecture 891
LASC - Certificate in Latin American Studies 893
LATN - Latin 893
LBSC - Library Science 894
LGBT - Lesbian Gay Bisexual Transgender Studies 896
LING - Linguistics 897
MAIT - Masters in the Mathematics of Advanced Industrial Tech 899
MATH - Mathematics 900
MEES - Marine-Estuarine-Environmental Sciences 905
MIEH - Maryland Institute for Applied Environmental Health 907
MITH - Maryland Institute for Technology in the Humanities 910
MLAW - MPower Undergraduate Law Programs 910
MOCB - Molecular and Cell Biology 910
MSMC - Museum Scholarship and Material Culture 910
MUED - Music Education 910
MUET - Ethnomusicology 912
MUSC - School of Music 912
MUSP - Music Performance 918
NACS - Neuroscience & Cognitive Science 918
NAVY - Navy 919
NFSC - Nutrition and Food Science 919
NRMT - Natural Resources Management 922

PERS - Persian 922
PHIL - Philosophy 922
PHSC - Public Health Science 924
PHYS - Physics 925
PLCY - Public Policy 929
PLSC - Plant Sciences 933
PORT - Portuguese 937
PSYC - Psychology 937
PUAF - Public Policy 945
RDEV - Real Estate Development 945
RELS - Religious Studies 947
RUSS - Russian 947
SLAA - Second Language Acquisition and Application 948
SLAV - Slavic 949
SLLC - School of Languages, Literatures and Cultures 950
SOCY - Sociology 951
SPAN - Spanish 956
SPHL - Public Health 959
STAT - Statistics and Probability 961
SURV - Survey Methodology 963
TDPS - Theatre, Dance and Performance Studies 970
THET - Theatre 970
TLPL - Teaching and Learning, Policy and Leadership 975
TLTC - Teaching and Learning Transformation Center 991
TOXI - Toxicology 991
UMEI - Maryland English Institute 991
UNIV - University Courses 992
URSP - Urban Studies and Planning 992
USLT - Latina/o Studies 993
VMSC - Veterinary Medical Sciences 994
WMST - Women's Studies 995
Policies 999
Admissions Policies 999
Registration Policies 1003
Tuition, Fees, and Expenses 1008
Policies for Graduate Assistantships 1010
Graduate Student Fellowships 1018
Academic Record 1022
Master's Degrees Policies 1026
Doctoral Degrees Policies 1031
Combined Bachelor's-Master's Programs 1037
Dual Doctoral and Master's Degrees 1037
Graduate Certificate Policies 1038
Graduate School Field Committees 1038
University of Maryland Graduate Faculty Members 1039
Other Graduate School Policies 1040
Graduate School Services 1048
Appendices 1050
Resources 1051
About the University 1053
Academic Calendars 1054
Semester Calendar 1054
12-Week Term Calendar 1054
Accreditation 1056
University Administration and Deans 1057
Division of Academic Affairs 1057
Division of Administration and Finance 1057
Division of Information Technology 1058
Division of Student Affairs 1058
Division of University Relations 1058
Equity Council 1058
Office of Diversity and Inclusion 1058
Office of the President 1058
Office of Undergraduate Studies 1059
The Graduate School 1059
University Senate 1059
Index 1060

HOME

The University of Maryland, College Park is the state's flagship university and one of the nation's preeminent public research universities. A global leader in research, entrepreneurship and innovation, the university is home to more than 40,000 students, 10,000 faculty and staff, and 352,000 alumni all dedicated to the pursuit of Fearless Ideas. Located just outside Washington, D.C., we discover and share new knowledge every day through our renowned research enterprise and programs in academics, the arts and athletics. As the nation’s first “Do Good” campus, we are committed to social entrepreneurship.

GRADUATE CATALOG

The Graduate Catalog is the official listing of the policies governing graduate education at the University of Maryland, College Park.

This Catalog documents policies and procedures set by the Graduate Council and the Graduate School, and is updated each academic semester to reflect changes and updates to policy. Information on admissions policies, academic policies (including degree requirements), registration policies, and financial aid and student support policies are contained in the Catalog. Abstracts and information on academic degree and certificate programs, a list of graduate-level courses by program, and a roster of graduate faculty members are also included in each edition of the Catalog.

The University of Maryland, the flagship institution of the University System of Maryland, originated in 1856 as the Maryland Agricultural College and became one of the country's first land-grant institutions in 1867. The state assumed authority over the College in 1920 and formed the University of Maryland by joining the College with long-established professional schools in Baltimore. In 1988, the General Assembly of Maryland designated the College Park campus as the flagship institution for the University System of Maryland, which comprises 13 institutions across the state. The College Park campus is built around a central mall, anchored by McKeldin Library and the Main Administration Building. Fanning out from the mall are thirteen academic colleges. The University's mission is to provide graduate and undergraduate education of the highest quality, to pursue advanced research, and to serve the needs of the State of Maryland.

The University of Maryland and its surrounding area provide boundless opportunities for conducting research. The University's dynamic research environment allows students from all disciplines to undertake scholarly exploration of their special interests and to gain valuable practical experience. It also enables faculty members to advance their own areas of expertise and bring their research insights into the classroom. On campus, special facilities and a number of organized research centers, bureaus, and institutes promote the acquisition and analysis of new knowledge in the arts, sciences, and applied fields.

Steve Fetter
Associate Provost and Dean of the Graduate School

Amanda Strausser, General Editor
February 2022

THE GRADUATE SCHOOL

The University of Maryland Board of Regents mandates that a Graduate Faculty and a Graduate Council provide the organization by which the Graduate Faculty discharge its responsibilities for graduate education. The Graduate Council, appointed by the Dean of the Graduate School, includes faculty representatives elected by the Graduate Faculty, and graduate students. The Graduate Council recommends to the Dean, the Provost and the President policies that affect all aspects of graduate education at the University. A list of the current Graduate Council members can be found on our Graduate School website (https://gradschool.umd.edu/).

The Graduate School, under the leadership of its Dean, establishes and oversees procedures to enact these policies and serves as an advocate for excellence in all aspects of graduate education.

The Graduate School, on behalf of its Dean, officially admits all students into graduate degree programs and acts as the conferring body for all graduate degrees.

In conjunction with the Graduate Council, the Graduate School:

- Administers all University policies that affect graduate education.
- Sets academic and admissions standards for graduate programs.
- Reviews applications for admission to the Graduate School for compliance with academic standards.
- Admits graduate students to all programs.
- Administers the processes for graduate students' grievances
- Admits and oversees the academic progress of non-degree seeking students.
- Reviews and approves all new graduate programs.
- Allocates annual fellowship funding to the colleges, sets minimum stipend levels, and monitors the application and academic impact of awards.
- Recommends annual minimum stipend levels for fellowships and teaching and research assistantships.
- Sets policy for and awards tuition remission as a component of University fellowship awards, external fellowships, and training grants.
- Establishes qualifications for and approves membership in the Graduate Faculty.
- Establishes qualifications necessary for graduate faculty to serve on and to chair thesis and dissertation examining committees.
- Sets policy that governs the composition of the thesis and dissertation examining committees and the conduct of the examinations.
- By appointment of a Dean's representative, oversees dissertation examinations to assure quality and uniformity of standards across academic units.
- Oversees the process of submitting approved dissertations and theses preservation of and access to the documents are the responsibilities of the University Library.
- Sets University-wide requirements for awarding graduate degrees.
- Recommends to the President that students who meet established requirements be awarded graduate degrees.
- Reviews and approves as appropriate requests for exceptions to University policies on graduate matters.
- Ensures that the University maintains official graduate student records are kept in the Office of the Registrar.
- Approves and oversees programs created by interdisciplinary Field Committees.
- Approves the programs for the Master's degree and graduate certificate in Professional Studies.
- Prepares and disseminates an annual report on graduate education.
- Administers the General Research Board, the Creative and Performing Arts Awards, the Goldhaber Travel Grants, and other programs.
- Assumes leadership in the recruitment and retention of graduate students with special emphasis on students from under-represented groups.
- Provides orientation programs, advising, and other support services that contribute to the successful matriculation, retention, and graduation of a diverse population of graduate students .
- Supports the Graduate Student Government, graduate student groups, and the Office of Graduate Student Life.

The policies and procedures that are found in this document have been approved by the Graduate Council, the Dean of the Graduate School, the Provost, and the President.

INTRODUCTION TO THE UNIVERSITY OF MARYLAND

Location of Campus and Nearby Academic Resources

Situated on 1,300 acres in the suburban town of College Park, the University is centrally located in the Baltimore-Washington corridor. This unique location, just nine miles from downtown Washington, D.C., and approximately 30 miles from both Baltimore and Annapolis, enhances research opportunities for faculty and students by providing access to some of the finest libraries and research centers in the country.

The University Libraries (https://www.lib.umd.edu/mckeldin/) support the mission of the university and work to ensure students and faculty of all disciplines achieve their academic goals. Seven libraries on campus serve the diverse needs of graduate students, and a helpful team of librarians provides subject-specific expertise and support. You can find your librarian by searching https://www.lib.umd.edu/directory/specialists (https://www.lib.umd.edu/directory/specialists/). Collections range in format from online books and journals to archival manuscripts, photos and recordings. Thanks to the Big Ten Academic Alliance, researchers have easy access to the 100+ million books in the combined collections of the libraries of the Big Ten.

The University's main library is Theodore R. McKeldin Library (https://www.lib.umd.edu/mckeldin/). Its collections are especially strong in humanities, social sciences and the life sciences. Among its 1.2 million volumes is one of the best collections of Judaica in the region. The U.S. Congress has designated the library a federal depository for U.S. government documents and contains materials including legislative hearings, Congressional reports, federal regulations and census records, available to all Maryland residents.

Of particular interest to graduate students, the Research Commons (https://www.lib.umd.edu/rc/) in McKeldin Library offers services and programs to support high-level researchers under one umbrella. Among them: the highly popular IRRoC (https://irroc.umd.edu/) website, which integrates research resources on campus to help researchers compete for funding, manage projects and disseminate findings. The GIS and Geospatial Center located within the Research Commons offers computers and software to support a broad range of geographic, GIS and visualization needs. Graduate students can attend workshops, consult experts in statistics or data mining, or seek assistance from Research Commons partners such as the Graduate School Writing Center.

The Research Commons also offers a “Common Quandaries” Workshops series each semester—a sequence of workshops and panels addressing frequent concerns and questions that arise in graduate-level research. Our workshop series in the past have included topics on creating data management plans, creating a professional online presence, using citation managers, and navigating the world of publishing and conferencing.

The Terrapin Learning Commons (https://www.lib.umd.edu/tlc/home/), also in McKeldin Library, accommodates collaborative work by providing group study rooms, configurable furnishings, and equipment to borrow. The John and Stella Graves MakerSpace, located within the Terrapin Learning Commons, is open to all students regardless of major and offers visitors the opportunity to experiment with new technologies including 3-D scanners and printers, virtual reality and more.

The concept of the Research Commons extends to the STEM Library (https://www.lib.umd.edu/stem/), which contains not only a makerspace and GIS consulting lab, but also materials in physics, chemistry, engineering, mathematics, and geology with other significant collections in computer science, environmental sciences, water resources, and aerospace science. The STEM Library is a U.S. patent and trademark depository library.

The Architecture Library (https://www.lib.umd.edu/architecture/)contains materials on architectural design, theory and history, urban design, landscape architecture, and building technology. This library's collections include architecture books dating as far back as the 17th century, with materials on world expositions from 1851 to 1937. It is open to the public M-F from 11:00 AM to 4:00 PM. All students enrolled in programs within the School of Architecture, Planning and Preservation have 24/7 swipe access with their ID cards.

The Art Library (https://www.lib.umd.edu/art/)collects materials in art history, studio art, art education, photography, graphic arts, interior design, and textiles. Collections include art reproductions and art exhibition catalogs.

Part of the Clarice Smith Performing Arts Center, the Michelle Smith Performing Arts Library (https://www.lib.umd.edu/mspal/)is the central location on the College Park campus for music, theatre, and dance materials. Included in the Performing Arts Library is the International Piano Archives at Maryland (IPAM), which houses one of the world's most extensive concentrations of piano recordings.

Hornbake Library (https://www.lib.umd.edu/hornbake/)houses many of the University's special collections as well as the University Archives. Distinguished by their rarity or format, special collections are particularly strong in labor history, mass media and culture, the state of Maryland, literature and rare books, post-War Japan, historic preservation, and women’s history. Library Media Services (https://www.lib.umd.edu/lms/), located within Hornbake Library, supports access to and the creation of audio/visual media. It hosts media-centric learning and teaching spaces and multimedia production labs and studio.

Ten minutes from campus, Severn Library (https://www.lib.umd.edu/severn/) is a high-density shelving facility that houses unique and semi-rare research collections. Deliveries from Severn Library arrive at McKeldin Library daily.

Home to information managers, programmers, systems analysts, and digitization experts, the University Libraries are uniquely positioned to offer technology-based solutions for specific research needs. Digital Scholarship and Publishing (https://www.lib.umd.edu/publish/), for example, offers a wide range of services, tools and consultation to members of the University community to aid in the dissemination and long-term preservation of their scholarly work. The Digital Repository at UMD (DRUM) collects, preserves, and provides public access to the scholarly output of the university. Faculty and researchers can upload research products for rapid dissemination, global visibility and impact, and long-term preservation. Librarians also provide expert guidance and consultation in data management planning and data sharing and publishing.

Accreditation

The University of Maryland is accredited by the Middle States Association of Colleges and Secondary Schools and is a member of the prestigious Association of American Universities. Individual graduate programs may be accredited by their appropriate agencies. Students should check with their graduate program of interest for particular accreditations.

Non-Discrimination Statement

The University of Maryland is committed to the elimination of discrimination on the basis of race, color, creed, sex, sexual orientation, marital status, personal appearance, age, national origin, political affiliation, physical or mental disability, or on the basis of the exercise of rights secured by the First Amendment of the United States Constitution. The Human Relations Code is established to prevent or eradicate such discrimination in accordance with due process within the University community. In doing so, the University recognizes that it must strive actively and creatively to build a community in which opportunity is equalized.

Every effort will be made to make students and potential students, employees and potential employees, faculty members and potential faculty members aware of the opportunities that the University provides for every individual to develop and utilize his or her talents and skills. It is the intent of the University to observe and promote respect for each member of the community's own race, ethnic background, sex, or sexual orientation. The Human Relations Code is accessible in its entirety online (https://www.umd.edu/).

Under advice of the Maryland Attorney General's Office, the University may interpret the Code to include both gender identity and gender expression.

Disclaimer

The provisions of this publication are not to be regarded as an irrevocable contract between the student and the University of Maryland. Changes are effected from time to time in the general regulations and in the academic requirements. There are established procedures for making changes that protect the institution's integrity and the individual student's interest and welfare. A curriculum or graduation requirement, when altered, is not normally made retroactive unless the alterations are to the student's advantage and can be accommodated within the span of years normally required for graduation. When a competent authority judges the actions of a student, using established procedures, to be detrimental to the interests of the University community, that person may be required to withdraw from the university.

PROGRAMS

- Accounting (BMAC) (p. 23)
- Accounting (online) (OMAC) (https://academiccatalog.umd.edu/graduate/programs/accounting-omac-online/)
- Additive Manufacturing (PMAM) (p. 26)
- Additive Manufacturing (Z115) (p. 25)
- Administration, Supervision & Curriculum (Z900) (p. 27)
- Aerospace Engineering (ENAE) (p. 27)
- Aerospace Engineering (PMAE) (p. 29)
- Aerospace Engineering (Z053) (p. 30)
- African American Studies (Z096) (p. 31)
- Agricultural and Resource Economics (AREC) (p. 33)
- Air Quality Science and Technology (Z047) (p. 35)
- American Studies (AMST) (p. 36)
- Animal Sciences (ANSC) (p. 38)
- Anthropology (ANTH) (p. 41)
- Applied Anthropology and Historic Preservation (AAHP) (p. 43)
- Applied Counseling and Human Services (Z069) (p. 44)
- Applied Economics (off-campus) (ECAO) (https://academiccatalog.umd.edu/graduate/programs/applied-economics-off-campus-ecao/)
- Applied Economics (off-campus) (MPEC) (p. 45)
- Applied Economics (on-campus) (ECAM) (https://academiccatalog.umd.edu/graduate/programs/applied-economics-on-campus-ecam/)
- Applied Economics (on-campus) (MPEM) (p. 46)
- Applied Entomology (MPAE) (p. 46)
- Applied Mathematics & Statistics, and Scientific Computation (AMSC) (p. 49)
- Applied Political Analytics (APAN) (https://academiccatalog.umd.edu/graduate/programs/applied-political-analytics-apan/)
- Architecture (ARCH) (p. 51)
- Architecture and Community Planning (ARCP) (p. 54)
- Architecture and Historic Preservation (ARHP) (p. 55)
- Architecture and Real Estate Development (ARDV) (p. 57)
- Art History and Archaeology (ARTH) (p. 59)
- Art Studio (ARTT) (p. 61)
- Astronomy (ASTR) (p. 63)
- Atmospheric & Oceanic Science (Z046) (p. 68)
- Atmospheric and Oceanic Science (AOSC) (p. 66)
- Atmospheric and Oceanic Science Technology (MPAO) (p. 68)
- Beekeeping (Z088) (p. 69)
- Behavioral and Community Health (BCHL) (p. 70)
- Behavioral and Community Health (MBCH) (p. 72)
- Behavioral and Community Health (online) (MBCO) (https://academiccatalog.umd.edu/graduate/programs/behavioral-community-health-online-mbco/)
- Bilingual Speech-Language Pathology (Z125) (https://academiccatalog.umd.edu/graduate/programs/bilingual-speech-pathology-z125/)
- Bilingual Speech-Language Pathology for Practitioners (Z141) (https://academiccatalog.umd.edu/graduate/programs/bilingual-speech-language-pathology-for-practitioners-z141/)
- Biochemistry (BCHM) (p. 74)
- Bioengineering (BIOE) (p. 76)
- Bioengineering (online) (MEBI) (p. 77)
- Bioengineering (online) (Z083) (p. 79)
- Bioengineering (PMBI) (p. 80)
- Bioengineering (Z054) (p. 81)
- Biological Resources Engineering (ENBE) (p. 82)
- Biological Sciences (BISI) (p. 83)
- Biophysics (BIPH) (p. 86)
- Biostatistics (BIOS) (p. 87)
- Business Administration (BMBA) (p. 90)
- Business Administration (online) (OMBA) (p. 97)
- Business Administration and Accounting (BAAC) (p. 89)
- Business Administration and Business Analytics (BABA) (https://academiccatalog.umd.edu/graduate/programs/business-administration-analytics-baba/)
- Business Administration and Finance (BAFN) (p. 93)
- Business Administration and Information Systems (BAIS) (p. 94)
- Business Administration and Marketing Analytics (BAMA) (p. 95)
- Business Administration and Medicine (BMED) (https://academiccatalog.umd.edu/graduate/programs/business-administration-medicine-bmed/)
- Business Administration and Nursing (BNRS) (p. 97)
- Business Administration and Pharmacy (BPHR) (p. 99)
- Business Administration and Public Policy (BMPO) (p. 100)
- Business Administration and Real Estate Development (MBRE) (p. 102)
- Business Administration and Social Work (BMSW) (p. 103)
- Business Administration and Supply Chain Management (BASC) (p. 104)
- Business Administration, Executive (CMBA) (p. 91)
- Business Administration, Executive (EMBA) (p. 92)
- Business Analytics (BMAN) (p. 105)
- Business Analytics (online) (OMAN) (https://academiccatalog.umd.edu/graduate/programs/business-analytics-oman/)
- Business and Management (BMSB) (p. 106)
- Business and Management (BPHD) (p. 107)
- Business and Management (online) (OMBM) (https://academiccatalog.umd.edu/graduate/programs/business-management-ombm-online/)
- Business Management and Law (LMBA) (p. 108)
- Chemical and Biomolecular Engineering (PMCH) (p. 109)
- Chemical and Biomolecular Engineering (Z055) (p. 110)
- Chemical and Life Sciences (CLFS) (p. 113)
- Chemical Engineering (ENCH) (p. 112)
- Chemical Physics (CHPH) (p. 115)
- Chemistry (CHEM) (p. 117)
- Civil and Environmental Engineering (ENCE) (p. 119)
- Civil and Environmental Engineering (PMCE) (p. 120)
- Civil and Environmental Engineering (Z056) (p. 122)

- Classics (CLAS) (p. 123)
- Clinical Audiology (CAUD) (p. 125)
- Clinical Psychological Science (MPPS) (p. 127)
- Communication (COMM) (p. 128)
- Communication Management (Z045) (p. 129)
- Community Counseling (COCM) (p. 130)
- Community Planning (CMPL) (p. 130)
- Community Planning and Behavioral/Community Health (CPMB) (https://academiccatalog.umd.edu/graduate/programs/community-planning-behavioral-health-cpmb/)
- Community Planning and Biostatistics (CPBI) (https://academiccatalog.umd.edu/graduate/programs/community-planning-biostatistics-cpbi/)
- Community Planning and Environmental Health Sciences (CPMI) (https://academiccatalog.umd.edu/graduate/programs/community-planning-environmental-health-cpmi/)
- Community Planning and Epidemiology (CPEP) (https://academiccatalog.umd.edu/graduate/programs/community-planning-epidemiology-cpep/)
- Community Planning and Health Administration (CPHA) (https://academiccatalog.umd.edu/graduate/programs/community-planning-health-administration-cpha/)
- Community Planning and Health Equity (CPHL) (https://academiccatalog.umd.edu/graduate/programs/community-planning-health-equity-cphl/)
- Community Planning and Health Policy Analysis and Evaluation (CPAE) (https://academiccatalog.umd.edu/graduate/programs/community-planning-health-policy-analysis-cpae/)
- Community Planning and Historic Preservation (CPHP) (p. 132)
- Community Planning and Information Management (CPIM) (https://academiccatalog.umd.edu/graduate/programs/community-planning-information-management-cpim/)
- Community Planning and Law (LCPL) (p. 133)
- Community Planning and Physical Activity (CPPH) (https://academiccatalog.umd.edu/graduate/programs/community-planning-public-health-cpph/)
- Community Planning and Public Health Practice and Policy (CPPP) (https://academiccatalog.umd.edu/graduate/programs/community-planning-public-health-practice-policy-cppp/)
- Community Planning and Real Estate Development (CPDV) (https://academiccatalog.umd.edu/graduate/programs/communityplanning-realestatedevelopment-cpdv/)
- Comparative Biomedical Sciences (VMSC) (p. 409)
- Comparative Literature (CMLT) (p. 134)
- Computation and Mathematics for Biological Networks (Z132) (https://academiccatalog.umd.edu/graduate/programs/computation-mathematics-biological-networks-z132/)
- Computational Harmonic Analysis (Z023) (p. 135)
- Computational Methods in Atmospheric & Oceanic Science (Z048) (p. 136)
- Computer Networking (Z117) (p. 136)
- Computer Science (CMSC) (p. 137)
- Computing Systems (Z118) (p. 138)
- Consecutive Interpreting (Z080) (p. 139)
- Counseling & Personnel Services (Z901) (p. 141)
- Counseling Psychology (COCP) (p. 142)
- Couple and Family Therapy (FCFT) (p. 144)
- Creative Writing (CRWR) (p. 146)
- Criminal Justice Administration (online) (Z130) (https://academiccatalog.umd.edu/graduate/programs/criminal-justice-administration-z130/)
- Criminology and Criminal Justice (CJCH) (p. 147)
- Criminology and Criminal Justice (CRIM) (p. 148)
- Critical Theory (Z017) (p. 149)
- Cultural and Heritage Resource Management (online) (MPCH) (p. 150)
- Cultural and Heritage Resource Management (Z121) (p. 151)
- Curation and Management of Digital Assets (online) (Z093) (p. 152)
- Curriculum and Instruction (EDCI) (p. 153)
- Curriculum and Instruction (Z902) (p. 155)
- Cybersecurity Engineering (online) (MECY) (p. 159)
- Cybersecurity Engineering (online) (Z092) (p. 155)
- Cybersecurity Engineering (PMCY) (p. 156)
- Cybersecurity Engineering (Z073) (p. 158)
- Cybersecurity Leadership (Z077) (p. 159)
- Dance (DANC) (p. 161)
- Data Journalism (online) (MPDJ) (https://academiccatalog.umd.edu/graduate/programs/data-journalism-mpdj/)
- Data Science (online) (Z136) (https://academiccatalog.umd.edu/graduate/programs/data-science-online-z136/)
- Data Science (Z104) (p. 162)
- Data Science and Analytics (MPDA) (https://academiccatalog.umd.edu/graduate/programs/data-science-analytics-mpda/)
- Data Science and Analytics (online) (MPDO) (https://academiccatalog.umd.edu/graduate/programs/data-science-analytics-online-mpdo/)
- Digital Studies (Z110) (p. 163)
- Ecological Economics (Z009) (p. 164)
- Economic Analysis (off-campus) (Z074) (p. 164)
- Economic Analysis (on-campus) (Z098) (p. 165)
- Economics (ECON) (p. 167)
- Ecosystems Restoration (Z041) (p. 168)
- Electrical and Computer Engineering (ENEE) (p. 168)
- Electrical and Computer Engineering (PMEE) (p. 171)
- Electrical and Computer Engineering (Z057) (p. 172)
- Electronic Packaging (online) (Z111) (p. 173)
- Electronic Packaging (Z112) (p. 174)
- Elementary & Middle School Science Education (Z051) (p. 175)
- Energy Systems Engineering (online) (MEEE) (p. 176)
- Energy Systems Engineering (online) (Z082) (p. 177)
- Energy Systems Engineering (PMSU) (p. 178)
- Energy Systems Engineering (Z066) (p. 179)
- Engineering and Public Policy (MEPP) (p. 180)
- English Language and Literature (ENGL) (p. 182)
- Entomology (ENTM) (p. 183)
- Environmental Engineering (PMEN) (p. 185)
- Environmental Engineering (Z058) (p. 186)
- Environmental Health Sciences (ENVH) (p. 188)
- Environmental Health Sciences (MIEH) (p. 189)

- Environmental Policy (EPOL) (p. 191)
- Environmental Policy (Z008) (p. 191)
- Environmental Science and Technology (ENST) (p. 192)
- Epidemiology (EPDM) (p. 194)
- Epidemiology (EPID) (p. 195)
- Ethnomusicology (MUET) (p. 197)
- Extension Education (AEED) (https://academiccatalog.umd.edu/graduate/programs/extension-education-aeed/)
- Family Science (FMSC) (p. 199)
- Finance (BMFN) (p. 201)
- Finance (online) (OMFN) (https://academiccatalog.umd.edu/graduate/programs/finance-omfn-online/)
- Financial Risk Management (Z122) (https://academiccatalog.umd.edu/graduate/programs/financial-risk-management-z122/)
- Fire Protection Engineering (ENFP) (p. 202)
- Fire Protection Engineering (online) (ENGF) (p. 203)
- Fire Protection Engineering (online) (Z049) (p. 204)
- Fire Protection Engineering (PMFP) (p. 206)
- Fire Protection Engineering (Z059) (p. 207)
- Food Safety Risk Assessment (Z027) (p. 207)
- French Language and Literature (FRIT) (p. 209)
- Fundamentals of Survey and Data Science (online) (Z129) (https://academiccatalog.umd.edu/graduate/programs/fundamentals-survey-data-science-z129/)
- Fundamentals of Survey Methodology (online) (Z127) (https://academiccatalog.umd.edu/graduate/programs/survey-methodology-online-z127/)
- Fundamentals of Survey Methodology (Z011) (https://academiccatalog.umd.edu/graduate/programs/survey-methodology-z011/)
- Fundamentals of Survey Statistics (online) (Z133) (https://academiccatalog.umd.edu/graduate/programs/survey-statistics-z133/)
- Game, Entertainment, and Media Analytics (online) (MPGA) (https://academiccatalog.umd.edu/graduate/programs/game-media-analytics-mpga/)
- Geographical Sciences (GEOG) (p. 210)
- Geology (GEOL) (p. 213)
- Geospatial Information Sciences (GEIC) (https://academiccatalog.umd.edu/graduate/programs/geospatial-information-sciences-geic/)
- Geospatial Information Sciences (GEIS) (https://academiccatalog.umd.edu/graduate/programs/geospatial-information-sciences-geis/)
- Geospatial Information Sciences (MPGC) (p. 215)
- Geospatial Information Sciences (MPGS) (p. 215)
- Geospatial Information Sciences (online) (GISO) (https://academiccatalog.umd.edu/graduate/programs/geospatial-information-sciences-giso-online/)
- Geospatial Information Sciences (online) (Z134) (https://academiccatalog.umd.edu/graduate/programs/geospatial-information-sciences-z134-online/)
- Geospatial Information Sciences (Z035) (p. 215)
- Geospatial Intelligence (GEIN) (https://academiccatalog.umd.edu/graduate/programs/geospatial-intelligence-gein/)
- Geospatial Intelligence (MPGI) (p. 217)
- Geospatial Intelligence (online) (GINO) (https://academiccatalog.umd.edu/graduate/programs/geospatial-intelligence-gino-online/)
- Geospatial Intelligence (online) (Z135) (https://academiccatalog.umd.edu/graduate/programs/geospatial-intelligence-z135-online/)
- Geospatial Intelligence (Z109) (p. 217)
- German Studies (GERS) (p. 218)
- Gerontology (doctoral level) (Z101) (p. 219)
- Gerontology (master's level) (Z100) (p. 220)
- Global Health (Z070) (p. 221)
- Government & The Private Economy (Z002) (p. 223)
- Government and Politics (GVPT) (p. 222)
- Health Administration (HLSA) (p. 224)
- Health Administration (online) (HLSO) (https://academiccatalog.umd.edu/graduate/programs/health-administration-online-hlso/)
- Health Care Management (HLCM) (https://academiccatalog.umd.edu/graduate/programs/health-care-management-hlcm/)
- Health Data Analysis (Z140) (https://academiccatalog.umd.edu/graduate/programs/health-data-analysis-z140/)
- Health Equity (HLEQ) (p. 225)
- Health Policy Analysis and Evaluation (HPAE) (p. 226)
- Health Services Research (PHHS) (p. 228)
- Hearing and Speech Sciences (HESP) (p. 229)
- Higher Education (HIED) (p. 231)
- Historic Preservation (HISP) (p. 233)
- Historic Preservation (Z005) (p. 237)
- Historic Preservation and American Studies (HPAM) (https://academiccatalog.umd.edu/graduate/programs/historic-preservation-american-studies-hpam/)
- Historic Preservation and Landscape Architecture (HPLA) (https://academiccatalog.umd.edu/graduate/programs/historic-preservation-landscape-architecture-hpla/)
- Historic Preservation and Real Estate Development (HPDV) (p. 235)
- History (HIST) (p. 239)
- History and Historic Preservation (HIHP) (https://academiccatalog.umd.edu/graduate/programs/history-historic-preservation-hihp/)
- History and Library & Information Science (HILS) (p. 241)
- Housing, Finance & Development (Z007) (p. 242)
- Human Development (EDHD) (p. 245)
- Human Development Education (Z903) (p. 247)
- Human-Computer Interaction (HCIM) (p. 243)
- Industrial/Organizational Psychology (MPIO) (p. 247)
- Information Assurance Management (Z026) (p. 249)
- Information Management (INFM) (p. 249)
- Information Management (online) (MIMO) (p. 251)
- Information Risk, Privacy, and Security (Z139) (https://academiccatalog.umd.edu/graduate/programs/information-risk-privacy-z139/)
- Information Studies (INFS) (p. 252)
- Information Systems (BMIS) (p. 253)

- Information Systems (online) (OMIS) (https://academiccatalog.umd.edu/graduate/programs/information-systems-omis-online/)
- Integrated Pest Management (Z089) (p. 254)
- Integrated Technology in Education (Z126) (https://academiccatalog.umd.edu/graduate/programs/integrated-technology-z126/)
- Intelligence Analysis (Z021) (p. 255)
- International Education Policy (HIEP) (p. 256)
- International Relations (MAIR) (https://academiccatalog.umd.edu/graduate/programs/international-relations-mair/)
- Interpreting (MPIN) (p. 258)
- Jewish Studies (JWST) (p. 259)
- Jewish Studies (Z018) (p. 260)
- Journalism (JOMJ) (p. 261)
- Journalism (JOUR) (p. 263)
- Journalism Studies (JOST) (p. 262)
- Justice Leadership (MPJL) (p. 264)
- Kinesiology (KNES) (p. 265)
- Landscape Architecture (LARC) (p. 269)
- Landscape Architecture and Community Planning (LACP) (p. 267)
- Latin American and Caribbean Studies (Z148) (https://academiccatalog.umd.edu/graduate/programs/latin-american-caribbean-studies-z148/)
- Leadership Education & Development (MPLD) (p. 271)
- Leadership in Diverse Organizations (Z131) (https://academiccatalog.umd.edu/graduate/programs/leadership-diverse-organizations-z131/)
- Leading and Managing Healthcare Transformation (Z124) (https://academiccatalog.umd.edu/graduate/programs/leading-healthcare-transformation-z124/)
- Library and Information Science (LBSC) (p. 271)
- Library and Information Science (online) (LBSO) (p. 273)
- Linguistics (LING) (p. 274)
- Literacy Coaching (Z038) (p. 277)
- Machine Learning (MPML) (https://academiccatalog.umd.edu/graduate/programs/machine-learning-mpml/)
- Machine Learning (online) (MPMO) (https://academiccatalog.umd.edu/graduate/programs/machine-learning-online-mpmo/)
- Marine, Estuarine, and Environmental Sciences (MEES) (p. 278)
- Marketing Analytics (BMMA) (p. 280)
- Marketing Analytics (online) (OMMA) (https://academiccatalog.umd.edu/graduate/programs/marketing-analytics-omma-online/)
- Materials Science and Engineering (ENMA) (p. 281)
- Materials Science and Engineering (PMMS) (p. 283)
- Materials Science and Engineering (Z060) (p. 284)
- Maternal and Child Health (MCHS) (p. 285)
- Mathematical Statistics (STAT) (p. 287)
- Mathematics (MATH) (p. 290)
- Mathematics of Advanced Industrial Technology (MAIT) (p. 289)
- Mathematics of Advanced Industrial Technology (Z022) (p. 289)
- Measurement, Statistics & Evaluation (Z019) (p. 294)
- Measurement, Statistics and Evaluation (EDMS) (p. 292)
- Mechanical Engineering (ENME) (p. 294)
- Mechanical Engineering (PMME) (p. 297)
- Mechanical Engineering (Z061) (p. 298)
- Methods of Public Analysis (Z001) (p. 299)
- Modern French Studies (FRMS) (p. 208)
- Multimedia Journalism (Z071) (p. 300)
- Museum Scholarship & Material Culture (Z016) (p. 301)
- Music (MUSA) (p. 303)
- Music Education (MUED) (p. 301)
- Music: Performance and Composition (MUSC) (p. 306)
- National Security Studies (Z003) (p. 311)
- Networking Software Development (Z119) (p. 311)
- Neuroscience and Cognitive Science (NACS) (p. 312)
- Neuroscience and Cognitive Science (Z037) (p. 312)
- Nonprofit Management and Leadership (Z116) (p. 314)
- Nutrition and Food Science (NUTR/FDSC) (p. 315)
- Organic and Sustainable Agriculture (Z090) (p. 317)
- Performance (MFAP) (p. 318)
- Philosophy (PHIL) (p. 319)
- Physical Activity (PHAC) (p. 320)
- Physics (PHYS) (p. 321)
- Plant Science (PLSC) (p. 323)
- Policy Studies (POSI) (p. 325)
- Population Studies (Z036) (p. 326)
- Principles of Public Health (Z076) (p. 327)
- Product Management (online) (MPCI) (p. 140)
- Professional Communication for Enhanced English Fluency (online) (Z106) (p. 329)
- Professional Communication for Enhanced English Fluency (Z105) (p. 330)
- Program Planning, Monitoring, and Evaluation (online) (Z147) (https://academiccatalog.umd.edu/graduate/programs/program-planning-evaluation-online-z147/)
- Program Planning, Monitoring, and Evaluation (Z146) (https://academiccatalog.umd.edu/graduate/programs/program-planning-evaluation-z146/)
- Project Management (online) (MEPM) (p. 330)
- Project Management (online) (Z040) (p. 332)
- Project Management (PMPM) (p. 333)
- Project Management (Z063) (p. 334)
- Psychology (PSYC) (p. 335)
- Public Administration (MPPA) (p. 337)
- Public Financial Management (Z094) (p. 338)
- Public Health Informatics (Z028) (p. 338)
- Public Health Practice and Policy (PHPP) (p. 339)
- Public Management (Executive) (EXPM) (p. 198)
- Public Management (MAMG) (p. 340)
- Public Management (Z004) (p. 341)
- Public Policy (MAPO) (p. 343)
- Public Policy and Law (LMPO) (p. 342)
- Public Policy and Social Work (BSWP) (https://academiccatalog.umd.edu/graduate/programs/public-policy-social-work/)

- Public Policy and Sustainable Development & Conservation Biology (PPCN) (p. 344)
- Public Safety Leadership and Administration (MPLA) (https://academiccatalog.umd.edu/graduate/programs/public-safety-leadership-mpla/)
- Public Sector Finance & Acquisition (Z033) (p. 345)
- Quantitative Finance (BMQF) (p. 345)
- Quantitative Finance (online) (OMQF) (https://academiccatalog.umd.edu/graduate/programs/quantitative-finance-omqf-online/)
- Radar Signal Processing (Z031) (p. 346)
- Real Estate Development (MPRE) (p. 346)
- Real Estate Development (RDEV) (p. 347)
- Real Estate Development (Z029) (p. 350)
- Reliability Engineering (ENRE) (p. 351)
- Reliability Engineering (online) (MERE) (p. 353)
- Reliability Engineering (online) (Z042) (p. 354)
- Reliability Engineering (PMRE) (p. 355)
- Reliability Engineering (Z064) (p. 356)
- Risk, Compliance, and the Law (Z108) (p. 358)
- Robotics Engineering (PMRO) (p. 360)
- Robotics Engineering (Z084) (p. 358)
- School Counseling (COSC) (p. 361)
- School Improvement Leadership (Z052) (https://academiccatalog.umd.edu/graduate/programs/school-improvement-leadership-z052/)
- School Improvement Leadership (Z138) (online) (https://academiccatalog.umd.edu/graduate/programs/school-improvement-leadership-online-z138/)
- School Librarianship (Z114) (p. 362)
- School Psychology (COSP) (p. 363)
- School System Leadership (EDUC) (p. 366)
- Scientific Computation (Z014) (p. 367)
- Second Language Acquisition (SLMA) (p. 367)
- Second Language Acquisition (SLPH) (p. 368)
- Second Language Acquisition (Z081) (p. 370)
- Security and Terrorism Studies (online) (MPTS) (https://academiccatalog.umd.edu/graduate/programs/security-terrorism-studies-mpts/)
- Sociology (SOCY) (p. 371)
- Software Engineering (online) (MESW) (https://academiccatalog.umd.edu/graduate/programs/software-engineering-online-mesw/)
- Software Engineering (online) (Z144) (https://academiccatalog.umd.edu/graduate/programs/software-engineering-online-z144/)
- Software Engineering (PMES) (p. 372)
- Software Engineering (Z065) (p. 373)
- Spanish Language and Literature (SPAP) (p. 374)
- Special Education (EDSP) (p. 377)
- Special Education (Z905) (p. 380)
- Special Education for General Education Teachers in Inclusive Classrooms (Z123) (https://academiccatalog.umd.edu/graduate/programs/special-education-inclusive-classrooms-z123/)
- Speech Language Pathology (SPLA) (p. 381)
- Student Affairs (HISA) (p. 383)
- Supply Chain Management (BMSC) (p. 385)
- Supply Chain Management (online) (OMSC) (https://academiccatalog.umd.edu/graduate/programs/supply-chain-online-omsc/)
- Supporting Children with Intensive Behavior Needs (Z137) (https://academiccatalog.umd.edu/graduate/programs/support-children-Z137/)
- Survey and Data Science (online) (MPDS) (p. 386)
- Survey and Data Science (SUDS) (https://academiccatalog.umd.edu/graduate/programs/survey-data-science-suds/)
- Survey and Data Science (SURV) (p. 388)
- Sustainable Development and Conservation Biology (CONS) (p. 389)
- Systems Engineering (ENSE) (p. 390)
- Systems Engineering (online) (MESE) (https://academiccatalog.umd.edu/graduate/programs/systems-engineering-online-mese/)
- Systems Engineering (online) (Z143) (https://academiccatalog.umd.edu/graduate/programs/systems-engineering-online-z143/)
- Systems Engineering (PMSE) (p. 392)
- Systems Engineering (Z067) (p. 393)
- Teaching and Learning, Policy and Leadership (EDTL) (https://academiccatalog.umd.edu/graduate/programs/teaching-learning-policy-leadership-edps/)
- Teaching and Learning, Policy and Leadership (TLPL) (p. 395)
- Teaching English to Speakers of Other Languages (online) (Z128) (https://academiccatalog.umd.edu/graduate/programs/teaching-english-speakers-languages-online-z128/)
- Teaching English to Speakers of Other Languages (Z099) (p. 394)
- Technology Entrepreneurship (MPTE) (p. 396)
- Technology Management (Z145) (https://academiccatalog.umd.edu/graduate/programs/technology-management-z145/)
- Technology Ventures and Innovation (Z068) (p. 397)
- Telecommunications (ENTS) (p. 398)
- Terrorism Analysis (Z039) (p. 399)
- Theatre and Performance Studies (THPF) (p. 402)
- Theatre Design (MFAT) (p. 400)
- Translation (MPTR) (p. 404)
- Translation (Z079) (p. 405)
- Transportation Policy and Planning (Z030) (p. 406)
- Urban Agriculture (Z091) (p. 407)
- Urban and Regional Planning and Design (URPD) (p. 408)
- Urban Design (Z012) (p. 408)
- Veterinary Medicine (VMED) (p. 411)
- Wireless Communications (Z120) (p. 412)
- Women's Studies (WMST) (p. 413)
- Women's Studies (Z006) (p. 414)
- World Languages Education (Z095) (p. 415)
- Youth Experience (Z113) (p. 415)

Accounting (BMAC)

Graduate Degree Program

R.H. Smith School of Business

Abstract

The MS in Accounting from the University of Maryland's Robert H. Smith School of Business is the perfect complement to your career. With specializations, you can choose which path your career takes. Smith's top-ranked faculty, reputation for being the among the best business schools in the Washington, D.C., region, scholarships and busy-season internships make this accounting program truly valuable.

The MS in Accounting program produces highly trained accounting professionals who are prepared for heightened accountability and the expanded role accounting plays in consulting, information management and strategic planning. You'll learn to carry out the rigorous internal auditing required to meet today's strict accounting and auditing standards.

Financial Assistance

Financial aid is available to qualified students in the form of fellowships, graduate assistantships, and scholarships.

Contact

Program information is available online at http://www.rhsmith.umd.edu. Please contact us at:

MBA/MS Admissions
Telephone: 301.405.2559
Email: masters@rhsmith.umd.edu
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742

Website: http://www.rhsmith.umd.edu

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE) (optional)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs/business-masters/academics/accounting (https://www.rhsmith.umd.edu/programs/business-masters/academics/accounting/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Accounting, Master of Science (M.S.) (p. 24)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database. The OCS also participates in regional and national career forums and job fairs.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Visit our website at http://www.rhsmith.umd.edu for more specific information.

Accounting, Master of Science (M.S.)

Non-thesis only: 30 credits required

Participants in the Master of Science in Accounting program gain the leading-edge knowledge and skills they need to bring exceptional value to their firms in today's high-stakes accounting arena - and earn an advanced accounting degree from one of the world's leading business schools. The curriculum is relevant, practical and applicable from day one, focusing on such key issues as: internal audit application and practice, current trends in corporate governance, the role of managerial accounting in overall management planning and control structure, fraud prevention, deterrence, detection, and control, and IT security, IT controls and IT auditing.

Course	Title	Credits
Core Requirements		
BUAC706	Business Ethics for Accountants and Auditors	2
BUAC707	Financial Statement Analysis for Accountants and Auditors	2
BUAC710	Advanced Managerial Accounting and Control Systems	2
BUAC712	Business Communications for Accountants and Auditors	2
BUAC714	Forensic Accounting/Auditing	2
BUAC740	Data Driven Decision Making (Data Driven Decision Making)	2
Electives		18
Total Credits		**30**

Additive Manufacturing, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements		
Required course:		3
ENME744	Additive Manufacturing	
Select four of the following core courses:		12
ENME600	Engineering Design Methods	
ENME607	Engineering Decision Making and Risk Management	
or ENRE671	Risk Assessment in Engineering	
ENME808	Advanced Topics in Mechanical Engineering (ENME808E Applied Machine Learning for Engineering and Design)	
ENME610	Engineering Optimization	
ENPM671	Advanced Mechanics of Materials	
Select five of the following pre-approved technical electives:		15
ENME647	Multiphase Flow and Heat Transfer	
ENME672	Composite Materials	
ENME770	Life Cycle Cost and System Sustainment Analysis	
ENPM641	Course ENPM641 Not Found	
ENPM808	Advanced Topics in Engineering (ENPM808G Additive Manufacturing for Aerospace, Energy and Water Applications)	
ENPM808	Advanced Topics in Engineering (ENPM808E Applied Topology Optimization)	
ENPM809	Special Topics in Engineering (ENPM809C Applied Statistics)	
Total Credits		**30**

Additive Manufacturing (Z115)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our graduate programs in Additive Manufacturing give students unique access to hands-on training in various methods of design, production systems, and fabrication from world-class experts. Students will also benefit from university resources like the Makerbot Innovation Center, a 3D printing space available to all UMD students.

FINANCIAL ASSISTANCE

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: ENPM (https://academiccatalog.umd.edu/graduate/courses/enpm/) ENME (https://academiccatalog.umd.edu/graduate/courses/enme/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Additive Manufacturing, Post-Baccalaureate Certificate (P.B.C.) (p. 26)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Additive Manufacturing (PMAM)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our graduate programs in Additive Manufacturing give students unique access to hands-on training in various methods of design, production systems, and fabrication from world-class experts. Students will also benefit from university resources like the Makerbot Innovation Center, a 3D printing space available to all UMD students.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

FINANCIAL ASSISTANCE

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENPM (https://academiccatalog.umd.edu/graduate/courses/enpm/) ENME (https://academiccatalog.umd.edu/graduate/courses/enme/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:
Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Additive Manufacturing, Master of Engineering (M.Eng.) (p. 25)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Additive Manufacturing, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required course:		3
ENME744	Additive Manufacturing	
Select four of the following:		9
ENME600	Engineering Design Methods	
ENME607	Engineering Decision Making and Risk Management	
or ENRE671	Risk Assessment in Engineering	
ENME610	Engineering Optimization	
ENME743	Applied Machine Learning for Engineering and Design	
ENPM671	Advanced Mechanics of Materials	
Total Credits		**12**

Administration, Supervision & Curriculum (Z900)

Graduate Certificate Program
College: Education

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Contact

College of Education
Benjamin Building
3942 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2359

Website: http://www.education.umd.edu
Courses: AASP

Admissions

This program is not currently accepting applications. Please see www.education.umd.edu (http://www.education.umd.edu) for information on other certificates.

Requirements

- Administration, Supervision & Curriculum, Certificate of Advanced Study (C.A.S.) (p. 27)

Administration, Supervision & Curriculum, Certificate of Advanced Study (C.A.S.)

This certificate is not currently accepting applications.

Aerospace Engineering (ENAE)

Graduate Degree Program
College: Engineering

Abstract

The Aerospace Engineering Department offers a broad program in graduate studies leading to the degrees of Master of Science (thesis and non-thesis) and Doctor of Philosophy. Graduate students can choose from the following areas of specialization: aerodynamics and propulsion; structural mechanics and composites; rotorcraft; space systems; and flight dynamics, stability and control. Within these disciplines, the student can tailor programs in areas such as computational fluid dynamics, aeroelasticity, hypersonics, composites, smart structures, finite elements, space propulsion, robotics, and human factors.

Financial Assistance

A number of graduate assistantships and fellowships are available for financial assistance. Graduate teaching and research assistantships are available beginning at $20,000 per year plus tuition and health benefits. In addition, a number of fellowships are available, such as Minta Martin Fellowships, Rotorcraft Fellowships, the Hokenson Fellowship, ARCS Fellowships, and various departmental fellowships and scholarships. These fellowships cover tuition in addition to a stipend. All full-time applicants are automatically considered for these fellowships.

Contact

Department of Aerospace Engineering
3179 Glenn L. Martin Hall Building
4298 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2376
Fax: 301.314.9001

Website: http://www.aero.umd.edu

Courses: ENAE (https://academiccatalog.umd.edu/graduate/courses/enae/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)*
- CV/Resume
- Writing Sample (optional)
- Description of Research/Work Experience
- Portfolio PDF Upload (optional for Ph.D., not required for M.S.)
- GPA: 3.2 for M.S. and 3.5 for Ph.D.

Applicants should have a B.S. degree in Aerospace Engineering (or in a closely related field) with a recommended minimum GPA of 3.2/4.0 from an accredited institution. Applicants with a marginal academic record may be conditionally approved for admission to the M.S. program if other evidence of accomplishment is provided (i.e. publications or exceptional letters of recommendation). Admission to the Ph.D. program requires an academic record indicating promise of the high level of accomplishment required for the degree. The Graduate Record Examination (GRE) is required for international applicants, and strongly encouraged for applicants seeking financial support.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants:		
US Citizens and Permanent Residents	M.S. - April 12, 2022	November 1, 2021
	Ph.D. - April 1, 2022	
International Applicants:		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	M.S. - March 15, 2022	M.S. - September 29, 2021
		Ph.D. - September 15, 2021

RESOURCES AND LINKS:
Program Website: aero.umd.edu (http://www.aero.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Aerospace Engineering, Doctor of Philosophy (Ph.D.) (p. 28)
- Aerospace Engineering, Master of Science (M.S.) (p. 28)

Facilities and Special Resources

The departmental facilities for experimental research include the Glenn L. Martin Wind Tunnel, the Composites Research Laboratory, the Space Systems Laboratory, and the facilities of the Center for Rotorcraft Education and Research. The Glenn L. Martin Wind Tunnel, with its 8-foot high by 11-foot wide test section, has a maximum operating speed of 330 feet per second. It is used extensively for development testing by industry as well as for research. There are also two smaller subsonic tunnels and a supersonic tunnel that are used in support of departmental research programs.

The Composites Research Laboratory is located in the Manufacturing Building. Its facilities include a microprocessor-controlled autoclave, a vacuum hot press, a two-axis filament winding machine, an MTS 220 Kip uniaxial testing machine, an x-ray machine and an environmental conditioning chamber. The laboratory provides for a full spectrum of specimen and component manufacture, preparation and instrumentation, inspection, and testing. The Space Systems Laboratory performs world-class research on space operations, with particular emphasis on neutral buoyancy simulation of space robotics and human factors. The Neutral Buoyancy Research Facility is a multi-million dollar laboratory built around a 50-foot diameter by 25-foot deep water tank for simulating the microgravity environment of space. Six different telerobotic systems are currently under test in this facility, which is one of only two operating in the United States and the only neutral buoyancy facility in the world to be located at a university. The facilities of the Alfred Gessow Rotorcraft Center include two experimental rotor rigs to test articulated and bearingless rotors in hovering and in forward flight. The hover test facility can accommodate up to a 6-foot diameter rotor. In addition, the facilities include a 10-foot diameter vacuum chamber to study the structural dynamic characteristics of spinning rotors in the absence of aerodynamic loads and a three-component laser Doppler anemometer for flowfield measurements. A new 20-foot by 20-foot by 30-foot anechoic acoustic test chamber is used to carry out impulsive noise studies of rotorcraft in hover. Dynamic scaled rotor blades are built using composite facility

Aerospace Engineering, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option: 30 credits

At least 12 of the 30 credits are to be in the main discipline. No more than 9 credits may be at the 400 level of which no more than 6 credits may be from department courses. For the thesis option, 6 credits of ENAE799 are required as well as the successful defense of the M.S. thesis. For the non-thesis option, students must write a scholarly paper.

Course	Title	Credits
Core requirement		
Select 24 credits of coursework [1]		24
Thesis or Non-thesis option		**6**
Thesis:		
ENAE799	Master's Thesis Research	
Non-thesis:		
Six additional credits of coursework		
Scholarly paper is required		
Specialization Options		
Aerodynamics and Propulsion		
Structural Mechanics and Composites		
Rotocraft		
Space Systems		
Flight Dynamics, Stability and Control		
Total Credits		**30**

[1] Minimum of 12 credits (four courses) in main study discipline (600 level or above). Maximum of nine credits (3 courses) at the 400 level, of which not more than six credits may be department courses.

Aerospace Engineering, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 36 credits beyond the Bachelor's degree, in addition to 12 credits of ENAE899. Required coursework should include not less than 18 hours within one departmental area of specialization, at least 6 hours from among the other areas of specialization in the Department, and not less than 9 hours in courses that emphasize the physical sciences or mathematics.

Advance to Candidacy: In addition to the course requirements below, students must pass a written qualifying and an oral comprehensive examination in order to advance to candidacy.

Post-Candidacy: Students must complete at least 12 credits of ENAE899 Doctoral Dissertation Research as well as successfully defend and submit an original dissertation.

Course	Title	Credits
Major Area Requirement		
Select a minimum of 18 credits within one of the following departmental core area of specializations:		18
Aerodynamics and Propulsion		
Flight Dynamics Stability and Control		
Rotocraft		
Space Systems		
Structural Mechanics and Composites		
Minor Area Requirement		
Select minimum of 6 credits are required within one of the other departmental core areas of specialization, or from another department		6
Math/Science Requirement		
Select a minimum of nine credits of coursework must emphasize mathematics, physical sciences, life sciences, or computer sciences [1]		9
Dissertation Research Requirements		
ENAE899	Doctoral Dissertation Research	12

[1] No more than 3 credits can be from the College of Engineering. The one engineering course that can count toward this requirement must not be a course that could apply to either the major or minor concentration area. At least 3 credits must be at the 600 level or higher.

Aerospace Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements		
Select 30 credits approved by the student's advisor		30
Total Credits		**30**

Aerospace Engineering (PMAE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Aerospace program prepares graduates to design, develop, and test aircraft, spacecraft, and missiles and supervise their manufacture. Students earning a Masters of Engineering degree will also gain the expertise needed to develop new technologies in areas such as structures, propulsion systems, vehicle movement and control, communications, and overall vehicle design for use in aviation, defense systems, and space exploration.
For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. Tuition and fees are subject to change.

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENAE (https://academiccatalog.umd.edu/graduate/courses/enae/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:
Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Aerospace Engineering, Master of Engineering (M.Eng.) (p. 29)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Aerospace Engineering, Post-Baccalaureate Certificate (P.B.C.)

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Students complete **12 credits** in one of the following specializations:

General

Course	Title	Credits
Select four courses and include at least one course from each of the three specializations:		12
ENAE641	Linear System Dynamics	
ENAE642	Atmospheric Flight Control	
ENAE654	Mechanics of Composite Structures	
ENAE655	Structural Dynamics	
ENAE656	Aeroelasticity	
ENAE674	Aerodynamics of Compressible Fluids	
ENAE676	Turbulence	
Total Credits		**12**

Rotocraft

Course	Title	Credits
Select four of the following:		12
ENAE631	Helicopter Aerodynamics I	
ENAE632	Helicopter Aerodynamics II	
ENAE633	Helicopter Dynamics	
ENAE634	Helicopter Design	
ENAE635	Helicopter Stability and Control	
Total Credits		**12**

Space

Course	Title	Credits
Select four of the following:		12
ENAE601	Astrodynamics	
ENAE602	Spacecraft Attitude Dynamics and Control	
ENAE691	Satellite Design	
ENAE694	Spacecraft Communications	
ENAE696	Spacecraft Thermal Design	
ENAE741	Interplanetary Navigation and Guidance	
ENAE791	Launch and Entry Vehicle Design	
Total Credits		**12**

Aerospace Engineering (Z053)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Aerospace program prepares graduates to design, develop, and test aircraft, spacecraft, and missiles and supervise their manufacture. Students earning a Masters of Engineering degree will also gain the expertise needed to develop new technologies in areas such as structures, propulsion systems, vehicle movement and control, communications, and overall vehicle design for use in aviation, defense systems, and space exploration.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate

FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENAE (https://academiccatalog.umd.edu/graduate/courses/enae/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:

Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Aerospace Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 30)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

African American Studies, Post-Baccalaureate Certificate (P.B.C.)

Course	Title	Credits
Core Requirements		
AASP611	Classic Texts and Contemporary Issues	3
AASP621	Public Policy and Black Communities	3
Select one additional AASP course		3
Select two electives		6
Select a Graduate Research Project or Practicum Internship		3
Total Credits		**18**

African American Studies (Z096)

Graduate Certificate Program
College: Behavioral and Social Sciences

Contact

African American Studies Department
1119 Taliaferro Hall
4280 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.1158
Fax: 301.314.9932

Website: http://www.aasd.umd.edu

Courses: AASP (https://academiccatalog.umd.edu/graduate/courses/aasp/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Not accepting applications	Not accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Not accepting applications	Not accepting applications

Other Deadlines: Please visit the program website at http://www.aasd.umd.edu

Requirements

- African American Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 31)

Agricultural and Resource Economics, Master of Science (M.S.)

Non-thesis only (scholarly paper required): 33 credits

Course	Title	Credits
Required courses:		
ECON603	Microeconomic Analysis I	3
AREC623	Applied Econometrics I	4
AREC624	Applied Econometrics II	4
AREC620	Optimization in Agricultural and Resource Economics	3
AREC610	Microeconomic Applications in Agricultural and Resource Markets	3
Select 16 credits of electives [1]		16
Defense of a scholarly paper		
Total Credits		**33**

[1] Elective courses are normally selected from M.S. level courses (600 level or above) in AREC or ECON but may be taken in other disciplines with adviser approval

The M.S. program trains students to conduct economic research in the fields of environmental and resource economics, agricultural economics, and development economics. It provides rigorous training in microeconomic theory and econometrics and in the application of microeconomics and econometrics to policy issues. Students completing their MS degrees go on to work in U.S. government agencies and international organizations.

Required courses for the M.S. program consist of basic coursework in microeconomic theory and econometrics:

- The first semester of the sequence in microeconomic theory (ECON603).
- A two-semester sequence in applied econometrics (AREC623 and AREC624).
- A one-semester course on mathematical optimization (AREC620).
- A one-semester course on applications of microeconomic theory to agricultural and resource economics (AREC610).

The first-year coursework normally includes these 17 credits (3 credits each for ECON603, AREC620, AREC610 plus 4 credits each for AREC623 and AREC624).

M.S. students fulfill additional coursework requirements by taking electives to suit their own interests during their second year. Elective courses are normally selected from M.S. level courses (600 level or above) in AREC or ECON but may be taken in other disciplines with adviser approval. For detailed information on the scholarly paper, see the 'MS Scholarly Paper Requirement' at http://www.arec.umd.edu/graduate/ms/ms-scholarly-paper-requirement (http://www.arec.umd.edu/graduate/ms/ms-scholarly-paper-requirement/)

Agricultural and Resource Economics, Doctor of Philosophy (Ph.D.)

Requirements for the Ph.D. degree include a minimum of 42 credits of coursework, completion of a four-course field, 12 credits of Ph.D. dissertation research (AREC899), development of a research paper worthy of submission to a well-regarded journal, development and defense of a dissertation prospectus, and successful defense of a Ph.D. dissertation.

The Ph.D. program trains students to design, perform, lead, and implement economic research projects in the fields of environmental and resource economics, agricultural economics, and development economics. It also trains students in how to disseminate research results in the major professional media including journals, reports, conferences, and seminars. It provides rigorous training in microeconomic theory and econometrics and in the application of microeconomics and econometrics to policy issues. Students completing their Ph.D. degrees find employment in academia, U.S. government agencies, international organizations, and consulting firms.

Students must earn a 'B-' or better in each of these courses and a B (3.0) average or better in graduate coursework. First-year students are also expected to complete self-directed instruction regarding econometric software during August and January, attend additional instruction and develop qualifying paper topics during January, and participate in a paper-writing workshop in June at the end of the first year. The June workshop helps students develop their research for publication in academic journals as well as oral presentation. This workshop is useful for fostering the completion of the required research paper.

Advancement to Candidacy: In addition to the course requirements below, students are required to submit and pass the Qualifying Paper, develop a research paper worthy of submission to a well-regarded journal, and pass the Ph.D. dissertation prospectus in order to advance to doctoral candidacy.

Course	Title	Credits
Required courses:		
ECON603	Microeconomic Analysis I	3
AREC623	Applied Econometrics I	4

AREC624	Applied Econometrics II	4
AREC620	Optimization in Agricultural and Resource Economics	3
AREC610	Microeconomic Applications in Agricultural and Resource Markets	3
ECON604	Microeconomic Analysis II	3
Select six elective courses, at least four of which must be chosen from the following:		18
AREC784	Energy Economics, Empirical Industrial Organization, and Public Policy	
AREC829	Policy Design and Causal Inference for Social Science	
AREC847	Networks, Social Learning and Technology Adoption	
AREC783	Environmental Taxation and Regulation	
AREC785	Advanced Economics of Natural Resources	
AREC815	Experimental and Behavioral Economics	
AREC825	Advanced Economic Welfare Analysis	
AREC832	Agricultural Policy Analysis	
AREC846	Development Microeconomics	
ECON781	Valuing Environmental Benefits	
AREC891	Introduction to Prospectus Development [1]	1
AREC892	Dissertation Prospectus Development [2]	3
Dissertation Research Requirements		
AREC899	Doctoral Dissertation Research (minimum of 12 research credits)	12
Total Credits		**54**

1 During the spring semester of their second-year, students are also required to take a 1-credit course intended to help students develop a dissertation topic.

2 This requirement is waived for any student who has completed a dissertation prospectus and passed a prospectus examination before the fall semester of the third year.

Agricultural and Resource Economics (AREC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Department offers both M.S. and Ph.D. degrees from one of the nation's premier graduate programs in agricultural and resource economics. Both programs focus on the application of advanced microeconomic theory and econometrics to issues in environmental and resource economics, agricultural economics, and development economics. Courses are taught by leading researchers in those fields, who combine rigorous scholarship with extensive policy experience.

The Department's faculty includes internationally prominent scholars in environmental and resource economics, agricultural economics, and development economics. In recognition of their research, Department faculty members have received such international awards as Germany's Alexander von Humboldt Prize, the American Economic Association's John Bates Clark Medal, and the Agricultural and Applied Economics Association's Quality of Research Discovery and Publication of Enduring Quality Awards, among others. Several have been elected fellows of such professional associations as the Agricultural and Applied Economics Association (formerly the American Agricultural Economics Association), the Association of Environmental and Resource Economics, the Econometric Society, and the American Statistical Association. Department faculty members have served as presidents of the American Agricultural Economics Association and Association of Environmental and Resource Economists and as editors and associate editors of the Journal of Environmental Economics and Management, the American Journal of Agricultural Economics, the Journal of Public Economics, and Environment and Development Economics, among others. One faculty member is currently a research fellow of the National Bureau of Economic Research. For additional Department highlights, please visit www.arec.umd.edu/graduate/prospective-students (http://www.arec.umd.edu/graduate/prospective-students/).

The policy experience of the Department's faculty is equal to its scholarship in both quality and extent. Three have served on the staff of the President's Council of Economic Advisers. Other policy experience includes service as consultants to agencies and organizations like the U.S. Department of Justice, the U.S. Department of Agriculture, the Environmental Protection Agency, the World Bank, and the Inter-American Development Bank. The University's location in the Washington, D.C., area provides numerous opportunities for interaction with the World Bank, International Food Policy Research Institute, Resources for the Future, International Monetary Fund, U.S. Department of Agriculture, U.S. Environmental Protection Agency, U.S. Agency for International Development, Food and Drug Administration, Inter-American Development Bank, Census Bureau, and a host of other such institutions and organizations. Questions about the Department's graduate programs should be directed to the Graduate Program Coordinator at arecgradpgm@umd.edu or 301-405-1820.

Financial Assistance

Graduate assistantships are offered to qualified applicants on the basis of past academic performance, research potential, and availability of funds. Many full-time students in the Department hold assistantships or some other form of financial aid. Part- time and summer work are sometimes available for students who do not have assistantships. Graduate fellowships are also available on a competitive basis.
The Department offers financial assistance in the form of graduate assistantships and fellowships. All applications are consideration for financial assistance.

Graduate Assistantships

Many of our students are supported by graduate assistantships with responsibilities for either research or teaching. Graduate assistants are expected to work an average of 20 hours a week on their research or teaching duties. They must maintain at least a B average. They are considered employees of the University and are thus covered by health insurance. In addition to a competitive salary, graduate assistants receive tuition remission for up to 10 credits in the fall and spring semesters and up to 8 credits each summer semester.

Fellowships

The Department awards a number of fellowships each year to highly qualified applicants. Annual fellowship stipends are highly competitive. Fellowship awards also include tuition remission of up to twelve credits per semester. Fellowships are awarded to Ph.D. students for two (2) years. After the expiration of the fellowship, the Department expects to provide Ph.D. fellowship recipients with an additional two years

of support as a graduate assistant subject to satisfactory academic progress. All applicants for financial aid are automatically considered for fellowships as well as assistantships.

Financial assistance in the form of loans and work study may also be available. Interested students should contact the University's Office of Student Financial Aid.

Contact

The AREC Graduate Program website at http://www.arec.umd.edu/graduate (http://www.arec.umd.edu/graduate/) provides course requirements, examination procedures, and descriptive material for the M.S. and Ph.D. programs.

Department of Agricultural and Resource Economics
2200 Symons Hall
7998 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1293
Email: arecgradpgm@umd.edu

Website: http://www.arec.umd.edu

Courses: AREC (https://academiccatalog.umd.edu/graduate/courses/arec/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- GRE Subject (optional)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationarec2021.pdf)
- Description of Research/Work Experience (optional)
- Publications/Presentations (optional)

At a minimum, students entering either the Department's M.S. or Ph.D. program are expected to have the following preparation:

1. Knowledge of macroeconomic theory at the intermediate level and microeconomic theory at the advanced level.
2. Knowledge of multivariate calculus and linear algebra.
3. Knowledge of elementary statistical methods.

Additional coursework in mathematics is desirable--for example, analysis, probability, advanced statistics, or differential equations.

Students are normally admitted to the MS and PhD programs only for the fall semester, because the first year program consists of course sequences that begin only in the fall.

TRANSFER FROM M.S. TO PH.D. PROGRAM

Students enrolled in the Department's M.S. program may apply for admission to the Department's Ph.D. program by submitting a new Graduate School application, supplemental transcripts, and three letters of recommendation. The Graduate School application fee is waived if the student applies for the Ph.D. program in or before the semester in which the M.S. degree will be completed. Students within the Department's M.S. program need not submit GRE's when applying for the Ph.D. program.

The University of Maryland's Graduate School accepts applications here (https://gradapply.umd.edu). Before completing the application, applicants are asked to check the Admissions Requirements (link is external) site for specific instructions.

As required by the Graduate School, all application materials are to be submitted electronically.

The electronic submission of application materials helps expedite the review of an application. Completed applications are reviewed by an admissions committee in each graduate degree program. The recommendations of the committees are submitted to the Dean of the Graduate School, who will make the final admission decision. Students seeking to complete graduate work at the University of Maryland for degree purposes must be formally admitted to the Graduate School by the Dean.

INFORMATION FOR INTERNATIONAL GRADUATE STUDENTS

The University of Maryland is dedicated to maintaining a vibrant international graduate student community. The office of International Students and Scholars Services (http://globalmaryland.umd.edu/) (link is external) (ISSS) is a valuable resource of information and assistance for prospective and current international students. International applicants are encouraged to explore the services they offer, and contact them with related questions. The University of Maryland Graduate School offers admission to international students based on academic information; it is not a guarantee of attendance. Admitted international students will then receive instructions about obtaining the appropriate visa to study at the University of Maryland which will require submission of additional documents. Please see the Graduate Admissions Process for International applicants (https://www.gradschool.umd.edu/admissions/international-admissions/) (link is external) for more information.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 7, 2022
International Applicants	

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 7, 2022

RESOURCES AND LINKS:
Other Deadlines: arec.umd.edu (http://www.arec.umd.edu)
Program Website: arec.umd.edu/graduate (https://www.arec.umd.edu/graduate/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Agricultural and Resource Economics, Doctor of Philosophy (Ph.D.) (p. 32)
- Agricultural and Resource Economics, Master of Science (M.S.) (p. 32)

Facilities and Special Resources

The AREC Department provides a 15-seat computer lab for the exclusive use of our graduate students. The lab is available 24 hours a day, 365 days a year. Another 25-seat lab is available by reservation for classes, presentations, and research (e.g., experimental economics sessions). These labs are equipped with thin client devices that connect end users to desktop virtual desktops. This solution allows graduate students to remotely access a virtual desktop with all the applications listed below, as well as their files stored on the network servers. The following applications are available at this time: ArcInfo, Fortran, Mathematica, Matlab, Mozilla Firefox, MS Office, R, SAS, Stata, StatTransfer,TextPad, Lyx and WinEdt. Graduate students can access the AREC network and Internet from home via several remote access methods. A multifunction printer/scanner/copier is available in the graduate student computer lab. Wireless access is available to the campus network.

The Department offers close proximity to an incomparable array of government agencies, international institutions, and non-governmental organizations devoted to environmental issues, agricultural policy, natural resource management, and international development. Opportunities for attending stimulating seminars abound. Many students find useful work experience, access to data, and cutting-edge thesis topics as well as future employment through these organizations. These include (all within approximately 10 miles) the U.S. Environmental Protection Agency, the U.S. Department of Agriculture and U.S. Economic Research Service, the U.S. Food and Drug Administration, Resources for the Future, the Joint Institute for Food Science and Nutrition, the Joint Global Change Research Institute, the National Center for Smart Growth Research and Education, the National Oceanic and Atmospheric Administration, the World Bank, the Inter-American Development Bank, the International Food Policy Research Institute, the Beltsville Agricultural Research Center with its National Agricultural Library, as well as the U.S. Capitol, Senate, and House of Representatives.

Air Quality Science and Technology, Post-Baccalaureate Certificate (P.B.C.)

Course	Title	Credits
Core Requirements		
AOSC600	Synoptic Meteorology I	3
AOSC624	Remote Sensing of Surface Climate	3
AOSC637	Course AOSC637 Not Found	3
AOSC633	Atmospheric Chemistry and Climate	3
Total Credits		**12**

Air Quality Science and Technology (Z047)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

This program is not currently accepting applications

Contact

Department of Atmospheric and Oceanic Science
3417 Atlantic Building
4254 Stadium Dr
University of Maryland
College Park, MD 20742
Telephone: 301.405.5391

Website: http://www.aosc.umd.edu

Courses: AOSC (https://academiccatalog.umd.edu/graduate/courses/aosc/)

Admissions

This program is not currently accepting applications

Requirements

- Air Quality Science and Technology, Post-Baccalaureate Certificate (P.B.C.) (p. 35)

American Studies, Master of Arts (M.A.)

Thesis option: 30 credits required
Non-thesis option: 30 credits required

Students take a total of 30 credits of coursework in American Studies and related disciplines and demonstrate the ability to conduct independent research by submitting an acceptable thesis or a scholarly paper in lieu of a thesis.

Course	Title	Credits
Core Requirements		
AMST601	Introductory Theories and History in American Studies	3
Select one Methods Seminar course		3
Select AMST designated seminar courses		9
Thesis or Non-Thesis Requirements		
Select one of the following options:		15
Thesis:		
AMST799	Master's Thesis Research	
Select nine additional course credits		
Non-Thesis:		

Select 15 additional course credits and completion of a scholarly paper	
Total Credits	**30**

American Studies, Doctor of Philosophy (Ph.D.)

Doctoral students entering with a Bachelor's degree must complete a minimum of 42 credits of coursework. Doctoral students entering with a Master's degree must complete a minimum of 30 credits of coursework.

Advance to Candidacy: In addition to the coursework requirements below, all doctoral students must pass two comprehensive exams, as well as submit a Dissertation Prospectus. The first Comprehensive exam is on History, Theory, and Methods. The second exam is an Interdisciplinary Synthesis Paper.

Post-Candidacy: Complete at least 12 credits of AMST899 and write and defend an interdisciplinary dissertation that answers significant questions about American culture(s) and experiences, past or present.

Students entering with a Bachelor's degree

Minimum of 42 credits required

Course	Title	Credits
Core Requirements		
AMST601	Introductory Theories and History in American Studies	3
AMST603	Current Approaches to American Studies	3
AMST898	Pre-Candidacy Research	3
Select nine credits of AMST designated seminar courses		9
Select a three-credit methods seminar course		3
Specialization Requirements		
Select 18 credits of specialization courses, with nine credits in each		18
Dissertation Research Requirements		
AMST899	Doctoral Dissertation Research	12
Total Credits		**51**

Students entering with a Master's degree

Minimum of 30 credits required

Course	Title	Credits
Core Requirements		
AMST601	Introductory Theories and History in American Studies	3
AMST603	Current Approaches to American Studies	3
AMST898	Pre-Candidacy Research	3
Select nine credits of AMST designated seminar courses		9
Select a three-credit methods seminar course		3
Specialization Requirements		
Select 12 credits of specialization courses, with six credits in each		12
Dissertation Research Requirements		
AMST899	Doctoral Dissertation Research	12
Total Credits		**45**

American Studies (AMST)

Graduate Degree Program
College: Arts and Humanities

Abstract

American Studies offers an interdisciplinary program of study leading to the Masters of Arts and the Doctor of Philosophy degrees. Research and teaching in the Department focus on two intellectual themes: the cultures of everyday life, and cultural constructions of identity and difference. These themes drive our examinations of multiple cultures within the U.S., across the Americas, and transnationally. They also embrace numerous cultural studies approaches, including material and visual culture, ethnography and life history, popular culture and media studies, queer studies, studies of the body and sexualities, gender studies, food studies, digital cultures, critical race studies, and cultural landscapes and geography. Students develop expertise in multiple methodologies and take courses in many departments across the University. The Department benefits from a large and diverse affiliate faculty, strong relationships with cultural institutions such as the Smithsonian museums, and ready access to many other museums in the Baltimore-Washington corridor, government agencies, archives and historical societies, and multiple local communities. Students may also take advantage of graduate certificate programs for which our courses apply, including Museum Scholarship and Material Culture, Critical Theory, Historic Preservation, and Women's Studies. The program in U.S. Latina/o Studies is contained within the Department, and we have a leadership role in developing Native American Studies.

Financial Assistance

A limited number of teaching assistantships are available in addition to graduate fellowships. Students who hold assistantships typically teach two sections undergraduate AMST courses.

Contact

Additional information on program offerings, degree requirements, and financial aid can be obtained on the department's Web site (http://www.amst.umd.edu) and by writing to out contact address.

Department of American Studies
1328 Tawes Hall
7751 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1354
Fax: 301.314.9453
Email: amst-dgs@umd.edu

Website: http://www.amst.umd.edu

Courses: AMST (https://academiccatalog.umd.edu/graduate/courses/amst/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample
- Description of Research/Work Experience

Many admitted students have previously majored in American Studies, History, English, Ethnic Studies, Women's Studies, Anthropology, Art or Architectural History, Journalism, and Communications. However, applicants with broad backgrounds in arts and humanities and/or the behavioral and social sciences are also given serious consideration if interdisciplinary, American Studies-related subject matter or theories have been emphasized. Application requirements for both M.A. and Ph.D. programs include:

International applicants must also submit TOEFL scores. Applicants who do not yet have M.A. degrees and who desire to obtain the Ph.D. degree at Maryland should apply directly to the Ph.D. program.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 17, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 15, 2021

RESOURCES AND LINKS:

Program Website: amst.umd.edu (http://www.amst.umd.edu)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- American Studies, Doctor of Philosophy (Ph.D.) (p. 36)
- American Studies, Master of Arts (M.A.) (p. 35)

Facilities and Special Resources

The Washington, D.C. and Baltimore areas offer extraordinary research facilities for the study of past and present Americans$rsquo; experiences and culture, including the Library of Congress, the National Archives, the Smithsonian's many institutions, the National Park Service, the Maryland Historical Society, and the Walters Art Museum and National Gallery, and other cultural institutions. The National Archives II, National Trust Library and Library of American Broadcasting are all located on the College Park campus. There are also numerous local and regional-focused museums, collections, archives, libraries, and "think tanks" that can support students' interests in issues and topics related to identity and difference and the cultures of everyday lfe. Through consortia arrangements with universities in the area, including George Washington University and Georgetown University, students may augment their programs with courses otherwise unavailable at the University of Maryland.

Animal Sciences, Master of Science (M.S.)

Thesis only: 30 credits

Course	Title	Credits
Course requirements including:		24
Minimum of 6 credits in ANSC graduate courses chosen with advisor		
Course in Biometrics		
ANSC624	Recent Advances in Animal and Avian Sciences	
or ANSC625	Developing Presentation Skills	
Research Ethics (training can be completed online for 0 credit)		
Additional graduate courses chosen with advisor		
Thesis Research Requirement		
ANSC799	Master's Thesis Research	6
Total Credits		**30**

Students are required to complete 24 credits of graduate level coursework with no less than 12 hours must be earned in courses related to the major subject selected from the ANSC research focus areas. A minimum of 6 credit hours must have an ANSC designation. The plan of study should include courses in Biochemistry, Biometrics, and a course in Research Ethics.

During the first semester, the student selects an Adviser and an Advisory Committee (AC) with the approval of the Program Graduate Education Committee. By the end of the second semester, with the AC's advice, students file a proposed schedule of courses (plan of study). Committees may require that students take remedial courses if they enter with inadequate prerequisites or deficiencies in undergraduate programs. Also, by the end of the second semester a thesis research proposal must be approved by the student's AC.

Course requirements comprise at least one semester of graduate level statistics (e.g., Biometrics, typically BIOM601), one credit of ANSC624 or ANSC625 and a course in Research Ethics. Additional credits of graduate coursework should result in a total of 24 credits, of which no more than 12 credits can be at the 400 level. Furthermore, a minimum of six hours of thesis research credit (ANSC799) is required. Towards the end of their graduate studies, students must present the results and conclusions of their research in a public seminar and successfully defend their written thesis in a final oral examination, which is given by the AC. A final copy of the thesis must be submitted to the Program Office. Students with adequate undergraduate training usually complete the master's degree within two years.

Animal Sciences, Doctor of Philosophy (Ph.D.)

The M.S. degree is not a prerequisite but is advantageous for admission to the Ph.D. program. All PhD students must meet the MS coursework requirements either through a completed MS degree in Animal Sciences (US accredited university) and/or by taking additional coursework during their PhD program. PhD candidates must also satisfactory complete

a graduate level course in Statistics, typically BIOM 601, and either a course in Research Bioethics or completion of the Responsible Conduct of Research (RCR) – CITI Program provided through the Division of Research.

At least two credits of Seminar (with at least one in **ANSC624**) and one semester of teaching experience (8-10 hours per week) are required during study for the Ph.D. degree. ANSC624 is required of Ph.D. students even if it was taken while in the MS program. The ANSC seminars will be taken in non-consecutive semesters. In addition, a minimum of 12 research (ANSC899) credits is required.

Advancement to Candidacy: A plan of study must be filed with the approval of the student's Adviser and Advisory Committee (AC) by the end of the second semester and a research proposal by the end of the third semester. After no more than five semesters, the student must pass the Admission to Candidacy Examination, which consists of both written and oral components and is administered by the AC. At the time of advancement, students should have completed at least 80% of their Plan of Study.

Post-Candidacy: Towards the end of their studies, the candidates present the results and conclusions of their graduate research in a public seminar and defend their research in an oral examination, which is adjudicated by the student's AC. In addition to successful defense of the dissertation, it is expected that the student will publish at least one paper in a refereed scientific journal, based on the dissertation research. A final copy of the dissertation must be submitted to the Program Office. The Ph.D. degree is usually completed within four to six years.

Course	Title	Credits
Core Requirements		
Two credits of Seminar		2
ANSC624	Recent Advances in Animal and Avian Sciences	
Dissertation Research Requirements		
ANSC899	Doctoral Dissertation Research	12
Total Credits		**14**

Animal Sciences (ANSC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Graduate Program in the Animal Sciences offers graduate study leading to the Master of Science and Doctor of Philosophy degrees. The master's degree program does not offer a non-thesis option. Faculty research interests include:

1. Cell, molecular and developmental biology studies, gene expression of the neuroendocrine system during growth and development, molecular genetics of metal and heme homeostasis in animals, developmental potency and cell fate decisions during mammary gland development, maintenance of pluripotency and cell lineage determination in early embryos and stem cells, regulation of gene expression during embryonic patterning, neuro- and reproductive endocrinology in avian species, and virology, immunology and microbial pathogenesis of significance to animal agriculture;
2. Nutrition and intermediary metabolism of ruminants and non-ruminants, modeling for nutrient management, nutrient management in avian and other monogastric species, including forage utilization in horses; nutritional immunology, nutrient sensing, metabolic homeostasis, companion and exotic animal nutrition;
3. Aquaculture related fish physiology and genetics, and;
4. Application of computational and systems biology to quantitative genetics, genomics, epigenetics, selection theory and breeding for the improvement of domestic animals and conservation genetics.

Financial Assistance

A number of graduate combined research/teaching assistantships are available and awarded to students who present strong academic records and a capability and motivation to perform well in teaching or in research assignments. These assistantships are awarded on a competitive basis. Appointments are on an annual basis, with reappointment contingent on demonstration of successful progress towards the degree. Assistantships are available for up to two years for the M.S. degree and four years for the Ph.D. degree. As assistantships are generally awarded for Fall admittance, applications should be completed by the January 12 deadline for consideration.

Contact

For specific information on the program, admission procedures, or financial aid, see the ANSC website (https://ansc.umd.edu/graduate/) or contact the ANSC graduate program office as listed below.

Dr. Carol L. Keefer
Professor and Director, Graduate Program in Animal Sciences
Department of Animal and Avian Sciences
2129 Animal Sciences Center
8127 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5781
Email: ansc-gradprogram@umd.edu

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ANSC Graduate Office
Department of Animal and Avian Sciences
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Telephone: 301.405.5781
Email: ansc-gradprogram@umd.edu

Website: http://www.ansc.umd.edu

Relationships: Neurosciences and Cognitive Science (NACS) (p. 312), Veterinary Medical Sciences (VMSC) (p. 409)

Courses: ANSC (https://academiccatalog.umd.edu/graduate/courses/ansc/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume
- Description of Research/Work Experience (optional)

The Program requires applicants to submit an application online, and to submit official academic transcripts, statement of goals and research interests, at least three letters of recommendation, and official Graduate Record Examination scores (optional Spring/Fall 2022) to the Enrollment Services Operations Office. Applicants with degrees from non-English speaking countries and who have not received a degree from the list of approved English-speaking universities must also submit results of the Test of English as a Foreign Language (TOEFL). To be considered for an assistantship, submit your application by the preferred deadline.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	May 11, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	February 23, 2022	September 15, 2021

RESOURCES AND LINKS:
Program Website: ansc.umd.edu (http://www.ansc.umd.edu)
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Animal Sciences, Doctor of Philosophy (Ph.D.) (p. 37)
- Animal Sciences, Master of Science (M.S.) (p. 37)

Facilities and Special Resources

The Department of Animal and Avian Sciences and the nearby Gudelsky Veterinary Center housing the Virginia-Maryland Regional College of Veterinary Medicine, have extensive facilities consisting of faculty research laboratories, animal holding areas, a campus farm, aquaculture facility and outlying research farms. Additionally, the department maintains a teaching computer laboratory with 30 computers.

The research laboratories comprise nearly 28,000 square feet for bench work, averaging over 1000 square feet per faculty member. Over 2800 square feet of cold room and 2000 square feet of freezer rooms are integral components of the research laboratories. The laboratories are fully equipped with state-of-the-art modern instrumentation and equipment for the entire range of research carried out by the faculty, e.g. research in biochemistry, cell-molecular biology, physiology, nutrition, behavior, virology, immunology, microbial pathogenesis, etc. Individual laboratories are fully self-standing units, yet there is free exchange between laboratories having shared and collaborative interests. All the laboratories and offices are networked to the campus server for direct Internet access.

Nearly 15,000 square feet of space is dedicated for animal holding in the Animal Wing of the Animal Sciences Center. This facility is capable of handling all kinds of animals such as rodents, birds, fish and large animals for research in separate rooms. An aquaculture facility, adjoining the Gudelsky Center, is also available. The Animal Wing is under the care of trained staff and is supervised by a professional veterinarian.

Other facilities, such as the Laboratory for Biological Ultrastructure, the Visual Imaging Center, the DNA Sequencing Laboratory, the Proteomics Core Facility, etc., are available to the faculty and students as part of the Central Core Facilities on the campus.

Off Campus Research Facilities include:

1. Central Maryland Research and Education Center, Clarksville, MD
   This 925-acre dairy research center, located ~25 miles from the campus, houses 200 head of Holstein dairy cattle including 110 milking cows and 90 head of young stock. ANSC faculty engaged in nutrition, reproduction, physiology, herd health, behavior and management research, conduct their experiments at this facility.
2. Applied Poultry Research Laboratory, Upper Marlboro, MD
   This 202-acre facility is located approximately 20 miles from the campus. It is used for conducting research in nutrition, physiology and behavior.
3. Wye Beef Cattle Research Center
   This 450-acre facility is located on Maryland's Eastern Shore near Queenstown. It has 250 registered Angus beef cows plus young stock and bulls which are direct descendants of the Wye Angus herd. The facility is used to support research associated with beef cow-calf management, pasture management and growth physiology.

Anthropology and Historic Preservation, Master of Applied Anthropology and Master of Historic Preservation (dual degree) (M.A.A. and M.H.P.)

Non-thesis only (internship required): 66 credits

Requirements below are effective for students entering Spring 2020 or later

The Applied Anthropology and Historic Preservation dual degree takes full advantage of the diverse coursework offered at the University's School of Architecture, Planning and Preservation and the Department of Anthropology, bringing together expertise in archaeology, vernacular architecture, ethnography, cultural resource management, heritage studies and social/cultural anthropology. A total of 66 credit hours are required for the MAA/MHP dual degree.

Course	Title	Credits
Anthropology courses		
ANTH601	Applied Anthropology	3
ANTH606	Qualitative Methods in Applied Anthropology	3
ANTH630	Quantification and Statistics in Applied Anthropology	3

ANTH664	Anthropology of Cultural Heritage	3
or ANTH635	Archaeological Ethnography and Heritage Ethnography	
or ANTH640	Advanced Studies in Theory and Practice of Historical Archaeology	
ANTH722	Ecological Anthropology	3
ANTH740	Theories of the Past and Accomplishments of Archaeology	3
ANTH760	Development of Social/Cultural Theory	3
Internship Sequence:		
ANTH701	Anthropology Internship Preparation	3
ANTH789	Internship	6
ANTH712	Anthropology Internship Analysis	3
Historic Preservation courses		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
or ANTH698 (AI	Course ANTH698 (ANTH698B - ARCHAEOLOGICAL LAW) Not Found	
HISP655	American Vernacular Architecture	4
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
HISP650	Historic Preservation Studio Workshop	6
Elective		2
Total Credits		**66**

Anthropology, Master of Applied Anthropology (M.A.A.)

Non-thesis only: 42 credits

Course	Title	Credits
Core Requirements		
Core Courses:		
ANTH601	Applied Anthropology	3
ANTH606	Qualitative Methods in Applied Anthropology	3
ANTH760	Development of Social/Cultural Theory	3
ANTH722	Ecological Anthropology	3
ANTH630	Quantification and Statistics in Applied Anthropology	3
ANTH740	Theories of the Past and Accomplishments of Archaeology	3
Internship Sequence:		
ANTH701	Anthropology Internship Preparation	3
ANTH789	Internship	6
ANTH712	Anthropology Internship Analysis	3
Supporting Coursework		12
Total Credits		**42**

The program requires 42 credit hours of coursework, including a core sequence (18 credit hours), an internship sequence (12 credit hours), and a sequence of individually approved courses that are related to a chosen domain of application (12 credit hours). MAA students must satisfactorily complete an internship proposal review with their advisory committee before beginning the internship, which is normally completed during the summer term between the first and second years of the program. Students are also required to present the results of their internship in a departmental colloquium prior to graduation. There is no thesis requirement.

Anthropology, Doctor of Philosophy (Ph.D.)

Advancement to Candidacy: In addition to coursework requirements stated below, students admitted to the PhD program advance to candidacy upon passing three written area exams, as well as passing an oral defense of their dissertation proposal.

Post-Candidacy: Students are required to complete 12 credits of ANTH899 Doctoral Dissertation Research and pass an oral defense upon completion of the dissertation.

Students Entering the Doctoral Program with a Bachelor's Degree

72 credits required

Students entering the PhD from a Bachelor's degree must normally complete all the requirements for the MAA degree indicated above, although the internship sequence can be substituted with additional coursework under approved circumstances. An additional minimum of 30 credit hours of advanced coursework is required, to include at least 12 credit hours of dissertation research. Additional supportive coursework may be required on a case-by-case basis depending on the qualifications of the student. In such cases, these expectations will be specified upon admission to the PhD program.

Course	Title	Credits
Core Requirements		
Course Requirements:		
ANTH601	Applied Anthropology	3
ANTH606	Qualitative Methods in Applied Anthropology	3
ANTH760	Development of Social/Cultural Theory	3
ANTH722	Ecological Anthropology	3
ANTH630	Quantification and Statistics in Applied Anthropology	3
ANTH740	Theories of the Past and Accomplishments of Archaeology	3
Select 12 credits of Approved Electives		12
Select 18 credits of Advanced Coursework		18
Internship Sequence:		
ANTH701	Anthropology Internship Preparation	3
ANTH789	Internship	6
ANTH712	Anthropology Internship Analysis	3
Dissertation Research Requirements		

ANTH899	Doctoral Dissertation Research	12
Total Credits		**72**

Students Entering the Doctoral Program with a Master's Degree

60 credits required

For students entering the PhD program from the MAA, an additional minimum of 30 credit hours of advanced coursework is required, to include at least 12 credit hours of dissertation research. Students entering the PhD program with a master's degree from another institution are minimally required to complete the 18 credit-hour core sequence of the MAA program and an additional minimum of 30 credit hours of advanced coursework, to include at least 12 credit hours of dissertation research. These students are not normally required to complete the internship sequence, although in some cases their doctoral committee may decide that an internship may be appropriate to enhance a student's professional experience prior to graduation. Additional supportive coursework may be required on a case-by-case basis depending on the qualifications of the student. In such cases, these expectations will be specified upon admission to the PhD program.

Course	Title	Credits
Core Requirements		
Course Requirements:		
ANTH601	Applied Anthropology	3
ANTH606	Qualitative Methods in Applied Anthropology	3
ANTH760	Development of Social/Cultural Theory	3
ANTH722	Ecological Anthropology	3
ANTH630	Quantification and Statistics in Applied Anthropology	3
ANTH740	Theories of the Past and Accomplishments of Archaeology	3
Select 12 credits of Approved Electives		12
Select 18 credits of Advanced Coursework		18
Internship Sequence:		
ANTH701	Anthropology Internship Preparation	3
ANTH789	Internship	6
ANTH712	Anthropology Internship Analysis	3
Total Credits		**60**

Anthropology (ANTH)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Department of Anthropology at the University of Maryland offers graduate study leading to the Master of Applied Anthropology (M.A.A.), the Master of Applied Anthropology and Master of Historic Preservation (M.A.A./M.H.P. Dual Degree), the Masters of Professional Studies in Cultural and Heritage Resource Management (M.P.S. (CHRM)), and the Doctor of Philosophy (Ph.D.) degrees. Our graduate degrees reflect the department's interest and expertise in applied anthropology—the application of anthropological knowledge, anthropology-in-use, and practicing anthropology— in a variety of institutional and community settings.

Current faculty members represent two subfields of the discipline (archaeology and socio-cultural anthropology). Drawing their intellectual and applied orientations from training and application of the above subdisciplines, the department's faculty also recognize the need to identify topics or problems where the expertise of individual faculty members can be applied in a manner that integrates the subdisciplines. In this ongoing effort, the faculty has identified three areas of research concentration: Anthropology of Health, Anthropology of Environment, and Anthropology of Heritage. The areas can be thought to contain and generate research problems of interest to the faculty's experience and expertise within the subdisciplines. These problems can be addressed individually through socio-cultural anthropology and archaeology. However, the anthropological contribution to addressing these problems is enhanced by collaboration across subdiscipline interests and expertise.

The Master of Applied Anthropology (MAA) is a program designed both for students interested in an anthropology career outside of academia and for those who plan on continuing to a PhD. The program has been offered at the University of Maryland since 1984, and graduates have successfully secured employment or pursued doctoral work in a variety of fields, such as working in the areas of medical and health practice, urban and regional planning and development, community development, conservation and heritage resource development, cultural resource management, and historical archaeology. The focus of the MAA program has been to participate in the building of anthropological practice.

The dual degree Master's Program in Applied Anthropology and Historic Preservation is a holistic, comprehensive primer for a professional career in the research, understanding and preservation of cultural resources and heritage. The first of its kind in the United States, the new degree prepares students for the challenges—and increasing demand—of understanding, documenting and saving a wide range buildings, landscapes, sites and communities.

The graduate program in Cultural and Heritage Resource Management (CHRM) provides rigorous interdisciplinary training in the skills necessary to advance a career in cultural heritage resource management. CHRM graduate programs include a Master of Professional Studies or a Graduate Certificate. Built on a broad foundation including research methods, critical thinking, ethics, communication and technical writing, management techniques, and leadership skills, this program prepares professionals for employment or advancement with private contracting firms, governmental agencies, and non-profit organizations.

A major focus of the Doctor of Philosophy (PhD) program is to direct research scholarship and to encourage theoretical and methodological advancement in such a way as to reflect upon the specific practices of anthropology, with the aim of improving those practices and thereby increasing the value and usefulness of the discipline. Doctoral students are typically prepared for research and development careers outside of academic settings, as well as for academic careers in anthropology departments and other disciplinary settings.

Financial Assistance

A limited number of Departmental Fellowships and Teaching Assistantships are available to qualified graduate students. Part-time employment related to department research is occasionally available.

Doctoral students have the option of applying for Fellowships in Support of Diversity and Inclusion (https://anth.umd.edu/content/graduate-admissions/). If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social

Sciences, please be sure to upload your materials under "Supplementary Application" when submitting your online admissions application.

Contact

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Email: nadine@umd.edu

Website: http://www.anth.umd.edu

Courses: ANTH (p. 602)

Relationships: Applied Anthropology and Historic Preservation (AAHP) (p. 43), Historic Preservation (HISP) (p. 233), Cultural and Heritage Resource Management (MPCH (https://academiccatalog.umd.edu/graduate/programs/cultural-heritage-resource-management-mpch/)), Women's Studies (WMST) (p. 413)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample
- Supplementary Application (optional for Ph.D., not required for M.A.A.)
- Faculty of Interest

Doctoral students have the option of applying for Fellowships in Support of Diversity and Inclusion (https://anth.umd.edu/content/graduate-admissions/). If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social Sciences, please be sure to upload your materials under "Supplementary Application" when submitting your online admissions application.

If you're interested in applying for the M.A.A./M.H.P. program, please see the AAHP program here: https://gradschool.umd.edu/architectureplanningpreservation/aahp (https://gradschool.umd.edu/architectureplanningpreservation/aahp/)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 4, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 4, 2022

RESOURCES AND LINKS:
Program Website: anth.umd.edu (http://www.anth.umd.edu)
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Anthropology, Doctor of Philosophy (Ph.D.) (p. 40)
- Anthropology, Master of Applied Anthropology (M.A.A.) (p. 40)
- Cultural and Heritage Resource Management, Master of Professional Studies (M.P.S.) (p. 150)

Facilities and Special Resources

The Department has three archaeology labs (Archaeology in Annapolis, Archaeology of the Irish Diaspora and Modern Ireland, and the Center for Heritage Research Study) in addition to a Zooarchaeology Lab, an Ecological-Environmental Anthropology Lab, and Environmental Sensory Lab. Other research centers and programs include the Center for Research and Collaboration in the Indigenous Americas, Chesapeake Bay Environment Program, and the Deal Island Peninsula Project. Advanced computer software & hardware, such as scanners, graphic programs, and digitizing tablets are located in computer labs. UM is a Carnegie Class I research institution with opportunities for students to participate in research projects. The university is also part of the CIC.

Anthropology and Historic Preservation, Master of Applied Anthropology and Master of Historic Preservation (dual degree) (M.A.A. and M.H.P.)

Non-thesis only (internship required): 66 credits

Requirements below are effective for students entering Spring 2020 or later

The Applied Anthropology and Historic Preservation dual degree takes full advantage of the diverse coursework offered at the University's School of Architecture, Planning and Preservation and the Department of Anthropology, bringing together expertise in archaeology, vernacular architecture, ethnography, cultural resource management, heritage studies and social/cultural anthropology. A total of 66 credit hours are required for the MAA/MHP dual degree.

Course	Title	Credits
Anthropology courses		
ANTH601	Applied Anthropology	3
ANTH606	Qualitative Methods in Applied Anthropology	3
ANTH630	Quantification and Statistics in Applied Anthropology	3
ANTH664	Anthropology of Cultural Heritage	3
or ANTH635	Archaeological Ethnography and Heritage Ethnography	
or ANTH640	Advanced Studies in Theory and Practice of Historical Archaeology	
ANTH722	Ecological Anthropology	3
ANTH740	Theories of the Past and Accomplishments of Archaeology	3
ANTH760	Development of Social/Cultural Theory	3
Internship Sequence:		
ANTH701	Anthropology Internship Preparation	3
ANTH789	Internship	6
ANTH712	Anthropology Internship Analysis	3
Historic Preservation courses		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
or ANTH698 (AI	Course ANTH698 (ANTH698B - ARCHAEOLOGICAL LAW) Not Found	
HISP655	American Vernacular Architecture	4
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
HISP650	Historic Preservation Studio Workshop	6
Elective		2
Total Credits		**66**

Applied Anthropology and Historic Preservation (AAHP)

Graduate Degree Program
College of Behavioral and Social Sciences / School of Architecture, Planning and Preservation

Abstract

The University of Maryland's Dual degree Master's Program in Applied Anthropology and Historic Preservation is a holistic, comprehensive primer for a professional career in the research, understanding and preservation of cultural resources and heritage. The first of its kind in the United States, the new degree prepares students for the challenges—and increasing demand—of understanding, documenting and saving a wide range buildings, landscapes, sites and communities.

Why a Dual Degree?

Despite many overlapping themes, applied anthropology and historic preservation are very specific in their scope. Yet, as issues related to global heritage grow more complex, there is an increased demand for professionals who can transcend the multiple aspects of preservation and heritage. The new degree program positions students interested in pursuing a career in cultural heritage with a unique and competitive advantage; a comprehensive insight into both tangible heritage, such as architecture, artifacts and natural forms; and the intangible resources of society and culture. The experiential foundation offered by the two programs—including regional and international field studies, excavations and the use of LiDAR technology—offers the practical knowledge needed to succeed in an increasingly competitive and changing global market.

The Applied Anthropology and Historic Preservation dual degree takes full advantage of the diverse coursework offered at the University's School of Architecture, Planning and Preservation and the Department of Anthropology, bringing together expertise in archaeology, vernacular architecture, ethnography, cultural resource management, heritage studies and social/cultural anthropology. The establishment of the dual degree forwards the University's mission of continued educational development that fosters innovation and entrepreneurship, and addresses its commitment to reducing student debt through more affordable degree options.

Financial Assistance

The principal form of financial aid for students in this program consists of graduate assistantships related to research and outreach activities. Assistantships are offered by both Anthropology and Historic Preservation, and consist of tuition remission as well as a stipend. In addition, the HISP Program awards--in conjunction with local non-profit Prince George's Heritage--the Prince George's Heritage Preservation Fellowship, an annual competitive award for a HISP student or students whose Prince George's County related project is judged to be especially outstanding. Additionally, there are possibilities for paid internships and paid part-time work with a variety of national and local organizations and governmental agencies.

Contact

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FAX: 301.314.8305
Email: nadine@umd.edu

Website: http://www.arch.umd.edu or http://www.anth.umd.edu

Relationships: Historic Preservation (HISP) (p. 233)

Courses: ANTH (https://academiccatalog.umd.edu/graduate/courses/anth/) HISP (https://academiccatalog.umd.edu/graduate/courses/hisp/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose:
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample
- Description of Research/Work Experience (optional)
- Portfolio PDF Upload (optional)
- Faculty of Interest

Because this is a joint program, the application is through the School of Architecture, Planning and Preservation. To apply, choose > Architecture/Planning/Preservation > Applied Anthropology and Historic Preservation (AAHP)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 4, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 4, 2022

RESOURCES AND LINKS:

Other Deadlines: arch.umd.edu (http://www.arch.umd.edu/) or anth.umd.edu (http://www.anth.umd.edu/)
Program Website: arch.umd.edu/hisp/degree/master-historic-preservation (http://www.arch.umd.edu/hisp/degree/master-historic-preservation/) (Historic Preservation) or anth.umd.edu/landing/Graduate (https://anth.umd.edu/landing/Graduate/) (Anthropology)
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Anthropology and Historic Preservation, Master of Applied Anthropology and Master of Historic Preservation (dual degree) (M.A.A. and M.H.P.) (p. 42)

Applied Counseling and Human Services, Post-Baccalaureate Certificate (P.B.C.)

Course	Title	Credits
Core Requirements		
EDCP610	Professional Orientation	3
EDCP611	Career Development Theory and Programs	3
EDCP668	Special Topics in Rehabilitation	3
HESI418	Special Topics in Leadership	3
Total Credits		**12**

Applied Counseling and Human Services (Z069)

Graduate Certificate Program
College: Education

Abstract

The Department of Counseling, Higher Education, and Special Education at the University of Maryland offers an Online Graduate Certificate in Applied Counseling and Human Services with an emphasis on Career Planning and Placement for Youth in Transition (12 credits).

Contact

For additional information see information at the Department of Counseling, Higher Education, and Special Education http://www.education.umd.edu/CHSE/academics/degree_programs/YIT.html

For specific questions, contact Dr. Ellen Fabian, efabian@umd.edu (dneubert@umd.edu)

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Website: http://www.education.umd.edu

Courses: EDCP (p. 716)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 30, 2021	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

RESOURCES AND LINKS:
Other Deadlines: education.umd.edu (http://www.education.umd.edu)
Program Website: education.umd.edu/CHSE/academics/degree_programs/YI (https://www.education.umd.edu/CHSE/academics/degree_programs/YIT.html)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Applied Counseling and Human Services, Post-Baccalaureate Certificate (P.B.C.) (p. 44)

Applied Economics, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits

Course	Title	Credits
Core Requirements		
Core Courses:		15
ECON641	Microeconomic Analysis	
ECON642	Topics in Applied Macroeconomics	
ECON643	Empirical Analysis I: Foundations of Empirical Research	
ECON644	Empirical Analysis II: Introduction to Economic Models	
ECON645	Empirical Analysis III: Econometric Modeling and Forecasting	
Select five of the following field courses:		15
ECON670	Financial Economics	
ECON671	Economics of Health Care	
ECON672	Program Analysis and Evaluation	
ECON673	Information, Game Theory and Market Design	
ECON674	Economic Analysis of Law	
ECON675	Environmental Economics	
ECON676	Economic Development	
ECON683	International Macroeconomics and Finance	
ECON684	Applied Time Series Analysis and Forecasting	
Total Credits		**30**

The MPEC program emphasizes quantitative applied analysis. The curriculum includes all aspects of econometric modeling (including data collection, management and analysis) and incorporates hands-on STATA exercises into instruction. Courses provide students with rigorous training in economic reasoning, and the formulation and estimation of empirical economic models, with particular emphasis on using quantitative methods to evaluate policy proposals and programs. The 10-course program includes 5 'core courses' and 5 'field courses'. The 5 core courses include 2 applied theory courses (micro and macro) and a 3-course empirical analysis sequence. The field courses allow students to apply the tools learned in the core courses to specific fields of economics and public policy analysis.

Applied Economics (off-campus) (MPEC)

The off-campus Master of Professional Studies in Applied Economics (MPEC) program is no longer offered. Please see the off-campus Master of Science in Applied Economics (https://academiccatalog.umd.edu/graduate/programs/applied-economics-off-campus-ecao/) program page.

Admissions

The off-campus Master of Professional Studies in Applied Economics (MPEC) program is no longer offered. Please see the off-campus Master of Science in Applied Economics (https://academiccatalog.umd.edu/graduate/programs/applied-economics-off-campus-ecao/) program page.

Requirements

- Applied Economics, Master of Professional Studies (M.P.S.) (p. 45)

Applied Economics, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits

Course	Title	Credits
Core Requirements		
Core Courses:		15
ECON641	Microeconomic Analysis	
ECON642	Topics in Applied Macroeconomics	
ECON643	Empirical Analysis I: Foundations of Empirical Research	
ECON644	Empirical Analysis II: Introduction to Economic Models	

ECON645	Empirical Analysis III: Econometric Modeling and Forecasting	
Select five of the following field courses:		15
ECON670	Financial Economics	
ECON671	Economics of Health Care	
ECON672	Program Analysis and Evaluation	
ECON673	Information, Game Theory and Market Design	
ECON674	Economic Analysis of Law	
ECON675	Environmental Economics	
ECON676	Economic Development	
ECON683	International Macroeconomics and Finance	
ECON684	Applied Time Series Analysis and Forecasting	
Total Credits		**30**

The MPEM program emphasizes quantitative applied analysis. The curriculum includes all aspects of econometric modeling (including data collection, management and analysis) and incorporates hands-on STATA exercises into instruction. Courses provide students with rigorous training in economic reasoning, and the formulation and estimation of empirical economic models, with particular emphasis on using quantitative methods to evaluate policy proposals and programs. The 10-course program includes 5 'core courses' and 5 'field courses'. The 5 core courses include 2 applied theory courses (micro and macro) and a 3-course empirical analysis sequence. The field courses allow students to apply the tools learned in the core courses to specific fields of economics and public policy analysis.

Applied Economics (on-campus) (MPEM)

The on-campus Master of Professional Studies in Applied Economics (MPEM) program is no longer offered. Please see the on-campus Master of Science in Applied Economics (https://academiccatalog.umd.edu/graduate/programs/applied-economics-on-campus-ecam/) program page.

Admissions

The on-campus Master of Professional Studies in Applied Economics (MPEM) program is no longer offered. Please see the on-campus Master of Science in Applied Economics (https://academiccatalog.umd.edu/graduate/programs/applied-economics-on-campus-ecam/) program page.

Requirements

- Applied Economics, Master of Professional Studies (M.P.S.) (p. 45)

Applied Entomology, Master of Professional Studies (M.P.S.)

Non-thesis only (scholarly paper required): 30 credits

Course	Title	Credits
Core Requirements		
ENTM710	Insect Biodiversity, Physiology and Ecology	3
ENTM720	Native, Invasive, and Exotic Species	3
ENTM756	Insect Diseases and Pathology	3
ENTM760	Insects in the 21st Century	3
ENTM769	Capstone: Scholarly Paper	3
Select five Field Courses		15
Total Credits		**30**

Applied Entomology (MPAE)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Master of Professional Studies in Applied Entomology, a 30-credit, 10-course graduate program may be completed in as little as 15 months. Offered through the convenience and flexibility of the online learning environment, students enroll in two 3-credit courses per 12-week term.

In addition to the MPS in Applied Entomology, the Department of Entomology developed several fully online graduate certificate programs. Designed to offer flexibility to complete coursework in areas specific to your needs and interests (as well as to gain a valuable credential), successful completion of one or more of these programs may be used to fulfill requirements for the MPS. Each 12-credit program may be completed in one year by taking one 3-credit course per 12-week term.The Graduate Certificate programs are as follows:

- Graduate Certificate in Professional Studies in Beekeeping
- Graduate Certificate in Professional Studies in Integrated Pest Management (IPM)
- Graduate Certificate in Professional Studies in Organic and Sustainable Agriculture
- Graduate Certificate in Professional Studies in Urban Agriculture

Contact

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Website: http://oes-entm.umd.edu/

Courses: ENTM (https://academiccatalog.umd.edu/graduate/courses/entm/)

Relationships: Beekeeping (Z088) (p. 69), Integrated Pest Management (Z089 (p. 254)), Organic and Sustainable Agriculture (Z090) (p. 317), Urban Agriculture (Z091) (p. 407)

Admissions
GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (2)
- Bachelor's degree in a biological field (exceptions can be made with work experience in a biological field and strong letters of recommendation)
- GPA of 3.0 or higher (exceptions can be made with work experience in a biological field and strong letters of recommendation)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For complete Admission Information, please visit: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-applied-entomology/apply (https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-applied-entomology/apply/)

UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS).Additional requirements can be found here: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-applied-entomology/apply#International (https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-applied-entomology/apply/#International)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	August 19, 2022	February 18, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	August 19, 2022	February 18, 2022

RESOURCES AND LINKS:

Program Website: oes-entm.umd.edu (http://oes-entm.umd.edu/)

Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Applied Entomology, Master of Professional Studies (M.P.S.) (p. 46)

Applied Mathematics & Statistics, and Scientific Computation, Master of Science (M.S.)

Students must complete 30 credits of coursework in one of the three areas of concentration. All three concentrations offer both thesis and non-thesis options.

Students choose from one of the following concentrations:

APPLIED MATHEMATICS

Course	Title	Credits
Thesis Option - 30 credits		
Courses with primarily math content		12
Six credits in 600-800 level courses		
Numerical Analysis course (course options below; other courses must be approved by advisor)		
AMSC660	Scientific Computing I	
AMSC661	Scientific Computing II	
AMSC662	Computer Organization and Programming for Scientific Computing	
AMSC663	Advanced Scientific Computing I	
AMSC664	Advanced Scientific Computing II	
AMSC666	Numerical Analysis I	
AMSC714	Numerical Methods For Stationary PDEs	
AMSC715	Numerical Methods for Evolution Partial Differential Equations	
AMSC763	Advanced Linear Numerical Analysis	
AMSC764	Advanced Numerical Optimization	
AMSC799	Master's Thesis Research	6
Application Area courses (chosen with advisor)		6
Applied Math or appropriate seminar (chosen with advsior)		1
Additional coursework chosen with advisor		5
Non-thesis Option - 30 credits		
Courses with primarily math content		15
Nine credits in 600-800 level courses		
Numerical Analysis course (course options below; other courses must be approved by advisor)		
AMSC660	Scientific Computing I	
AMSC661	Scientific Computing II	
AMSC662	Computer Organization and Programming for Scientific Computing	
AMSC663	Advanced Scientific Computing I	
AMSC664	Advanced Scientific Computing II	
AMSC666	Numerical Analysis I	
AMSC714	Numerical Methods For Stationary PDEs	

AMSC715	Numerical Methods for Evolution Partial Differential Equations	
AMSC763	Advanced Linear Numerical Analysis	
AMSC764	Advanced Numerical Optimization	
Application Area courses (chosen with advisor)		6
Applied Math or appropriate seminar (chosen with advsior)		1
Additional coursework chosen with advisor		8
Pass the Qualifying Exam requirement		
Submit a Scholarly Paper		

Applied Statistics

Thesis option requires 25 credits of coursework including 18 credits of statistics core courses, six credits in an application area, and one credit of seminar. Students are also required to complete six credits of AMSC799.

Non-thesis option requires 33 credits of coursework including 18 credits of statistics core courses, six credits in an application area, six credits of electives, two credits of seminar, and one credit of AMSC762. Students are also required to pass three qualifying exams, and submit a scholarly paper.

Scientific Computation

Thesis option requires 24 credits of coursework including nine credits of scientific computing core courses, six credits of core science courses, and three credits of scientific computing application courses, and 6 credits of electives. Students must also complete six credits of AMSC799.

Non-thesis option requires 30 credits of coursework including 15 credits of scientific computing core courses, six credits of core science courses, three credits of scientific computing application courses, and six credits of electives. Students must also submit a scholarly paper.

Applied Mathematics & Statistics, and Scientific Computation, Doctor of Philosophy (Ph.D.)

Doctoral students must fulfill the coursework and pre-candidacy requirements of the corresponding concentration and/or pass a set of comprehensive written examinations at the Ph.D. level.

Details on the level and distribution of coursework and examinations in mathematics and in the applications area are given on the program web site: http://www.amsc.umd.edu/programs/index.html (http://www.amsc.umd.edu/programs/)

Students choose from one of the following concentrations:

Applied Mathematics

Students are required to complete 18 credits of courses with mathematical content with at least nine credits at the 600-898 level, and three credits in Numerical Analysis. Additional course requirements include six credits in an application area, nine credits of electives, two credits of approved seminars, and 12 credits of AMSC899.

Advancement to Candidacy: Students are also required to pass three written qualifying exams, and one oral exam

1. Mathematics Written Qualifying Exam
2. Application Area Written Qualifying Exam
3. Second Mathematics Written Qualifying Exam or coursework equivalents
4. Oral Candidacy Exam

Course	Title	Credits
Core Requirements		
Select 18 credits of courses with mathematical content with at least nine credits at the 600-898 level and three credits in Numerical Analysis		18
Select six credits in an application area		6
Select nine credits of electives		9
Select two credits of approved seminars		2
Dissertation Research Requirements		
AMSC899	Doctoral Dissertation Research	12
Total Credits		**47**

Applied Statistics

Students are required to complete 18 credits of statistics core courses, six credits of application courses, three credits of electives, three credits of AMSC760, two approved seminar or RIT courses, a one credit data project, and 12 credits of AMSC899.

Advancement to Candidacy: Students are also required to pass two written qualifying exams, and one oral exam

1. Mathematical Statistical Written Qualifying Exam
2. Application Statistics Written Qualifying Exam
3. Oral Candidacy Exam

Course	Title	Credits
Core Courses		
Select 18 credits of statistics core courses		18
Select six credits of application courses		6
Select three credits of electives		3
AMSC760	Applied Statistics Practicum	3
Select two approved seminar or RIT courses		2
Select a one credit data project		1
Dissertation Research Requirements		
AMSC899	Doctoral Dissertation Research	12
Total Credits		**45**

Scientific Computation

Students are required to complete 15 credits of scientific computing core courses, six credits of core science courses, six credits of scientific computing application courses, nine credits of electives, and 12 credits of AMSC899.

Advancement to Candidacy: Students are also required to pass an oral candidacy exam.

Course	Title	Credits
Core Courses		
Select 15 credits of scientific computing core courses		15

Select six credits of core science courses		6
Select six credits of scientific computing application courses		6
Select nine credits of electives		9
Dissertation Research Requirements		
AMSC899	Doctoral Dissertation Research	12
Total Credits		**48**

Applied Mathematics & Statistics, and Scientific Computation (AMSC)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The interdisciplinary program in Applied Mathematics & Statistics, and Scientific Computation (AMSC) offers graduate study leading to Master of Science and Doctor of Philosophy degrees with concentrations in applied mathematics, applied statistics, and scientific computation. It also offers a Certificate in Scientific Computation to graduate students enrolled in other university Ph.D. programs. The faculty is drawn from departments throughout the university. Possible areas of application include the physical, chemical, biological, and social sciences, and engineering. The program receives substantial support from the Department of Mathematics (MATH), the Center for Scientific Computation and Mathematical Modeling (CSCAMM), and the Institute for Physical Science and Technology (IPST). AMSC offers a spectrum of courses at the forefront of computation and applications, as well as state-of-the-art computational, visualization and networking facilities.

The Concentration in Applied Mathematics trains individuals who are able to enhance their understanding of a wide spectrum of scientific phenomena through the application of rigorous mathematical analysis. At least half of the required work is expected to be in courses with primarily mathematical content; the remaining courses must apply to a field outside of the usual mathematics curriculum in the student's chosen area of application. Graduate students currently pursue studies in the applications areas such as meteorology, fluid dynamics, algorithm development, pattern recognition, operations research, mathematical finance, computational dynamics, structural mechanics, mathematical biology, and systems and control theory. Other areas of study are available through participating departments. All students must include numerical analysis or scientific computing courses in their program of study.

The Concentration in Applied Statistics emphasizes acquisition of advanced training in the area of statistical application along with statistical topics and development of mathematical and computing skills necessary for the modern applied statistician. Students are required to take a series of core statistical and computational courses with more emphasis on data analytics and presentation skills. In addition, students will take a minimum of six credits in an outside application area.

The Concentration in Scientific Computation emphasizes the application of computation to the physical sciences, life sciences, engineering, business, and social sciences. Students will receive training in the use of computational techniques and technology with correspondingly less emphasis on formal mathematical methods in comparison to the Concentration in Applied Mathematics. Every Scientific Computation student is required to apply the training in computation to a problem in a specific scientific discipline.

A master's degree program in all concentrations with an emphasis on numerical analysis, computational methods, probability and statistics is excellent preparation for industrial or government employment.

Financial Assistance

The program offers teaching assistantships in the Department of Mathematics as a source of support for graduate students. These assistantships carry a stipend with remission of tuition of up to 10 credit hours each semester. Research assistantships are also available through participating departments and other sources, especially for students that have acquired advanced training. Assistantships are usually available only to incoming Ph.D. students; applications including letters of recommendation should be completed by December 15 for full consideration.

Contact

For more specific information, visit the program FAQ or email amsc@amsc.umd.edu.

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Website: https://amsc.umd.edu

Courses: AMSC (https://academiccatalog.umd.edu/graduate/courses/amsc/)

Relationships: Aerospace Engineering (ENAE) (p. 27), Animal Sciences (ANSC) (p. 38), Astronomy (ASTR) (p. 63), Atmospheric and Oceanic Science (AOSC) (p. 66), Biological Sciences (BISI) (p. 83), Business and Management (BPHD) (p. 107), Chemical Engineering (ENCH) (p. 112), Civil and Environmental Engineering (ENCE) (p. 119), Computer Science (CMSC) (p. 137), Economics (ECON) (p. 167), Electrical and Computer Engineering (ENEE) (p. 168), Geology (GEOL) (p. 213), Government and Politics (GVPT) (p. 222), Mechanical Engineering (ENME) (p. 294), Physics (PHYS) (p. 321)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)

- GRE Subject (optional but highly recommended)
- CV/Resume
- Description of Research/Work Experience (optional)

In addition to the Graduate School requirements, applicants are required to take the GRE general examination. The applicants are encouraged to take the GRE subject examination in either mathematics or another scientific topic. Applicants should have at least a "B" average (3.0 on a 4.0 scale) and should have completed an undergraduate program of study that includes a strong emphasis on rigorous mathematics, preferably through the level of advanced calculus and linear algebra.

Admission will be based on the applicant's ability to do graduate work in either applied mathematics, applied statistics, or scientific computation as demonstrated by the letters of recommendation, grades in coursework, and program of study. In some circumstances, a provisional admission may be given to applicants whose mathematical training is not sufficiently advanced. Previous education in an application area such as physics, biology, economics or one of the engineering disciplines, and a basic competence in computational techniques will be favorably considered in a student's application, although this is not a prerequisite.

When a student has decided upon an area of specialization, an advisory committee is formed and approved by the AMSC Graduate Committee. The advisory committee is responsible for formulating with the student a course of study that leads toward the degree sought. This course of study must constitute a unified, coherent program in an acceptable field of specialization of applied mathematics, applied statistics, or scientific computation.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 15, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 15, 2021

RESOURCES AND LINKS:

Program Website: amsc.umd.edu (https://www.amsc.umd.edu)
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Applied Mathematics & Statistics, and Scientific Computation, Doctor of Philosophy (Ph.D.) (p. 48)
- Applied Mathematics & Statistics, and Scientific Computation, Master of Science (M.S.) (p. 47)

Facilities and Special Resources

There are over 25 participating departments and institutes on the College Park campus, including units in the College of Computer, Mathematical, and Natural Sciences and the School of Engineering. The university has an engineering technical library as well as a network of high performance workstations for faculty and graduate students. In addition, there are collaborations with various area research institutes such as NASA Goddard Space Flight Center, National Institutes of Health, National Institute of Standards and Technology, Naval Research Laboratory, and National Oceanic and Atmospheric Administration.

Architecture, Master of Architecture (M.Arch.)

Path A: Advanced Standing Professional Degree Program

Course	Title	Credits
Core Requirements		
ARCH460	Site Analysis and Design	3
ARCH700	Urban Design Studio VII	6
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH Seminar		3
Electives		15
ARCH600	Integrated Design Studio V	6
ARCH601	Topical Design Studio VI	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH654	Urban Development and Design Theory	3
ARCH770	Professional Practice of Architecture	3
ARCH799	Master's Thesis Research	6
Total Credits		**60**

Path B: For students with a Baccalaureate outside of Architecture

Course	Title	Credits
Core Requirements		
ARCH404	Graduate Architecture Design Studio I	6
ARCH443	Visual Communication For Architects	3
ARCH405	Graduate Architecture Design Studio II	6
ARCH445	Visual Analysis of Architecture	3
ARCH406	Graduate Architecture Design Studio III	6
ARCH466	Environmental Systems in Architecture	3
ARCH407	Graduate Architecture Design IV	6
ARCH460	Site Analysis and Design	3
ARCH611	Advanced Architecture Technology Seminar	3
ARCH770	Professional Practice of Architecture	3
ARCH Seminars		6
ARCH798	Thesis in Architecture	3
ARCH462	Methods & Materials of Building Construction	3
ARCH426	History of Architecture II	3
ARCH463	Sustainable Systems in Architecture	3
ARCH425	History of Architecture I	3
ARCH464	Architectural Structures I	3
ARCH601	Topical Design Studio VI	6
ARCH465	Architectural Structures II	3
ARCH600	Integrated Design Studio V	6
ARCH654	Urban Development and Design Theory	3
ARCH797	Thesis Proseminar	3
Electives		12
ARCH799	Master's Thesis Research	6
Total Credits		**105**

Students entering the program with a four-year Bachelor of Science degree in Architecture from an accredited college or university normally

require two years of graduate study to complete the requirements for the professional Master of Architecture degree. The established curriculum requires four semesters of academic work encompassing a total of 60 credits. Additional credits may be required depending upon the admissions committee's evaluation of the individual's academic and architectural experience. Information on required courses and curriculum may be obtained from the School of Architecture, Planning and Preservation website at http://www.arch.umd.edu.

Students who enter the professional program with a B.A. or B.S. in a discipline other than architecture will normally require seven semesters of design studio and other prerequisite courses encompassing a total of 105 credits. Students may be granted advanced standing if they have completed the appropriate prerequisites. Information on required courses and curriculum may be obtained from the School of Architecture, Planning and Preservation website at http://www.arch.umd.edu.

A Graduate Certificate in Historic Preservation (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?Z005) is available to M. Arch and M.S. in Arch candidates. The course of study includes 16 credits of required courses.

A Graduate Certificate in Urban Design (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?Z012) is available to M. Arch and M.S. in Arch candidates. The course of study includes 15 credits of required courses.

Architecture, Master of Science (M.S.)

Thesis only: 30 credits

Course	Title	Credits
Core Requirements		
ARCH700	Urban Design Studio VII	6
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
ARCH Elective		3
Electives		9
Total Credits		**30**

A special option leading to the Master of Science in Architecture degree is available for those students who already possess an accredited NAAB professional degree in architecture (B.Arch. or M. Arch.) or its foreign equivalent. This option is designed to accommodate the needs of students who wish to do advanced work beyond that required for the professional degree. Applicants must specify in detail the nature of the proposed course of study for review and approval by the admissions committee prior to their admission. The School currently provides resources for advanced work in architectural design and urban design.

Architecture (ARCH)

Graduate Degree Program
School of Architecture, Planning and Preservation

Abstract

The School of Architecture, Planning and Preservation offers a graduate program leading to the National Architectural Accrediting Board (NAAB) accredited Master of Architecture degree. The Architecture Program (ARCH) seeks to change the world through innovative architectural and urban design pedagogies, research, and practice that transforms place at all scales and improves the quality of life. In the course of our mission, we instigate change through teaching, experience, and scholarly activity, which prepares the next generation of broadly educated, highly-skilled architects and designers to be problem seekers/solvers in collaborative learning and professional environments. The Program offers a rich and demanding mix of architectural and urban design studios, architectural history and theory, and architectural science and technology. Electives in architecture and related fields are available in the curriculum.

NAAB Required Statement on Accreditation:

In the United States, most registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit professional degree programs in architecture offered by institutions with U.S. regional accreditation, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted an eight-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may require a pre-professional undergraduate degree in architecture for admission. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

The School is a member of the Association of Collegiate Schools of Architecture (ACSA) and the Architectural Research Centers Consortium (ARCC).

Financial Assistance

The School of Architecture, Planning, and Preservation offers a limited and varying number of teaching and research assistantships, scholarships, fellowships, and internships. Applicants should apply for financial assistance when submitting the application for admission.

Contact

Find additional information on program offerings, degree requirements, admissions, and financial aid on the School's Website (www.arch.umd.edu (http://www.arch.umd.edu)). Schedule a visit and tour online at: http://arch.umd.edu/arch/prospective-students-arch (http://arch.umd.edu/arch/prospective-students-arch/). Sign up to receive an invitation to our Graduate Open House and receive more information online at: http://arch.umd.edu/mapp/graduate-inquiry-form (http://arch.umd.edu/mapp/graduate-inquiry-form/).

For further information on admissions and degree requirements, please contact Brian Kelly, AIA, Architecture Program Director, archadvise@umd.edu, 301-405-8000.

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Website: http://www.arch.umd.edu

Courses: ARCH (https://academiccatalog.umd.edu/graduate/courses/arch/) HISP (https://academiccatalog.umd.edu/graduate/courses/hisp/) RDEV (https://academiccatalog.umd.edu/graduate/courses/rdev/) URSP (https://academiccatalog.umd.edu/graduate/courses/ursp/)

Relationships: Historic Preservation (HISP) (p. 233), Real Estate Development (RDEV) (p. 347), Urban and Regional Planning and Design (URPD) (p. 408)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Portfolio PDF Upload (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationportfoliorequirementsarchardvarhparcp.pdf)

Admission to the graduate program is competitive. In addition to the Graduate School requirements, candidates must submit a portfolio. The portfolio should show evidence of creative ability in the form of a portfolio containing reproductions of creative work, which may include drawings, paintings, photographs, sculpture, sketches, and/or architectural designs. Details concerning format and content may be obtained from the School of Architecture, Planning and Preservation website

Applications from four categories will be considered for admission:

1. candidates with a four-year Bachelor of Science in architecture degree;
2. candidates with four-year baccalaureate (B.A.) in architecture, environmental design (B.A. or B.S.), or relevant discipline; and
3. candidates with four-year baccalaureate (B.A. or B.S.) in a major other than architecture who have successfully completed specified undergraduate prerequisites outlined by the School of Architecture, Planning, and Preservation[1]; and
4. candidates with an accredited professional degree in architecture. Students are expected to enroll on a full-time basis. For complete information on curricula requirements for these categories, visit the School of Architecture, Planning and Preservation website (http://www.arch.umd.edu./).

[1] Additional requirements include:
- one (1) semester of college level calculus or successful high school advanced placement (AP) calculus; and
- one (1) semester of college level physics with lab, or successful high school advanced placement (AP) in physics
- One (1) course in freehand figurative drawing is recommended but not required.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 19, 2022	January 19, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 19, 2022	September 30, 2021

RESOURCES AND LINKS:

Other Deadlines: arch.umd.edu (http://www.arch.umd.edu)
Program Website: arch.umd.edu/arch/architecture (http://www.arch.umd.edu/arch/architecture/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Architecture, Master of Architecture (M.Arch.) (p. 50)
- Architecture, Master of Science (M.S.) (p. 51)

Facilities and Special Resources

The School of Architecture, Planning, and Preservation is ideally located between Washington, DC, and Baltimore and surrounded by a number of historic communities and a varied physical environment. The resulting opportunity for environmental design study is unsurpassed. The School's resources include design workstations for each student, a model shop, a digital fabrication lab, and computer labs. The School's library contains some 57,000 monographs and 6,000 current periodicals, making it one of the major architectural libraries in the nation. The National Trust Library for Historic Preservation, housed in McKeldin Library, contains 11,000 volumes and 450 periodical titles. The slide collection includes approximately 430,000 slides on architecture, landscape architecture, planning, and technical subjects. The interdisciplinary National Center for Smart Growth Education and Research is based in the School offering perspectives and opportunities to engage important issues facing urban and regional planning.

The Architecture Program benefits from the strong support of the professional community, including practitioners who bring expertise into the architectural design studios as instructors, consultants, and critics. Many alumni are leaders in regional firms, while others practice as far away as New York, Los Angeles, Puerto Rico, Vancouver, London, and Shanghai.

The University of Maryland's team has won the ULI/Hines Competition several times, with each member of the team being awarded $10,000.

The award-winning Comprehensive Design Studio and Advanced Technology sequence (an integral component of the M. Arch curriculum)

offers an innovative teaching-learning environment where students work with an array of consultants from practice, exploring relationships between conceptual and technical aspects of architectural form and its assembly.

Embracing the importance of context as an integral component of the design process and advocating urban design as an essential component of architectural education, the Program has gained national and international recognition for its work in urban design, through awards and competition performance. Interdisciplinary competitions like the Urban Land Institute (ULI) Hines Urban Design Competition give architecture students opportunities to team up with fellow graduate students in planning, historic preservation, and real estate development to address urban issues in a work environment that prepares them for the collaborative experience of professional practice. In both 2014 and 2015 the University of Maryland's ULI-Hines competition team took first place in international competition bringing back over $50,000 in scholarship monies each time. The Urban Design Studio explores relationships between individual buildings, urban spaces, and the contexts in which they reside. Studios engage projects ranging from conceptual urban interventions to projects that help communities to envision future growth.

Study abroad opportunities augment the course of study offered in College Park. Summer and Winter study abroad programs are offered to a variety of locations including Rome, Paris, Scandinavia, Great Britain, Turkey, St. Petersburg, Egypt, Peru, and Sri Lanka. Summer and winter study opportunities are also available in conjunction with the Historic Preservation, Urban Studies & Planning, and Real Estate Development programs. A Spring Semester study abroad program is available in Florence.

Architecture and Community Planning, Master of Architecture and Master of Community Planning (dual degree) (M.Arch. and M.C.P.)

Path A: Advanced Standing for Students with a B.S. (75 or 78 credits)

Course	Title	Credits
Architecture courses		
ARCH460	Site Analysis and Design	3
ARCH600	Integrated Design Studio V	6
ARCH601	Topical Design Studio VI	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH654	Urban Development and Design Theory	3
ARCH 6xx	Architecture Elective	3
ARCH700	Urban Design Studio VII	6
ARCH 6xx	Architecture Elective	3
ARCH770	Professional Practice of Architecture	3
ARCH797	Thesis Proseminar	3
ARCH799	Master's Thesis Research	6
ARCH798	Thesis in Architecture	3
Community Planning courses		
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics	3
URSP xxx	Elective Social Requirement	3
URSP705	Summer Community Planning Studio I	4
URSP706	Summer Community Planning Studio II	2
URSP709	Field Instruction	0-3
Total Credits		**75-78**

Path B: For Individuals with a B.A. or B.S. (123 or 126 credits)

Course	Title	Credits
Architecture courses		
ARCH404	Graduate Architecture Design Studio I	6
ARCH405	Graduate Architecture Design Studio II	6
ARCH406	Graduate Architecture Design Studio III	6
ARCH407	Graduate Architecture Design IV	6
ARCH425	History of Architecture I	3
ARCH426	History of Architecture II	3
ARCH443	Visual Communication For Architects	3
ARCH445	Visual Analysis of Architecture	3
ARCH460	Site Analysis and Design	3
ARCH462	Methods & Materials of Building Construction	3
ARCH463	Sustainable Systems in Architecture	3
ARCH464	Architectural Structures I	3
ARCH465	Architectural Structures II	3
ARCH466	Environmental Systems in Architecture	3
ARCH600	Integrated Design Studio V	6
ARCH601	Topical Design Studio VI	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH654	Urban Development and Design Theory	3
ARCH770	Professional Practice of Architecture	3
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
ARCH 6xx	Architecture Elective	3
ARCH 6xx	Architecture Elective	3
Community Planning courses		
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics	3
URSP xxx	Elective Social Requirement	3
URSP688	Recent Developments in Urban Studies (URSP688L - Planning Technology)	3
URSP606	Planning Economics	3
URSP709	Field Instruction	0-3
URSP708	Community Planning Studio [1]	6
Total Credits		**123-126**

[1] Community Planning Studio is also offered in the summer as URSP705 and URSP706

Architecture and Community Planning (ARCP)

Graduate Certificate Program
School of Architecture, Planning and Preservation

Abstract

The dual degree combines course work from the Architecture and Urban Studies and Planning programs to enable a student to complete both the Master of Architecture (http://arch.umd.edu/arch/degree/master-architecture/) and Master of Community Planning (http://arch.umd.edu/ursp/degree/master-community-planning/) degrees with fewer credits than it would take to complete the two separately.

Students of the dual-degree program acquire specialized knowledge tailored to understanding the urban environment from several perspectives. Students learn how social, economic and political forces have led to the development of human habitats. The emphasis on urban design in the dual-degree program yields an education that is particularly applicable for persons interested in the revitalization of metropolitan areas and their center cities.

Applicants for the dual degree in Architecture and Community Planning should use the following four-letter code on the online application: ARCP

Contact

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Telephone: 301.405.6290
Email: irazabal@umd.edu (https://academiccatalog.umd.edu/graduate/programs/architecture-community-planning-arcp/www.irazabal@umd.edu)

Website: http://www.arch.umd.edu

Courses: ARCH (https://academiccatalog.umd.edu/graduate/courses/arch/) URSP (https://academiccatalog.umd.edu/graduate/courses/ursp/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (*students should discuss specific interest in pursuing a concurrent dual degree within two programs)*
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- GRE Subject (optional)
- Miller Analogies Test (MAT) (optional)
- Graduate Management Admission Test (GMAT) (optional)
- CV/Resume
- Portfolio (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationportfoliorequirementsarchardvarhparcp.pdf)
- Must be admitted by both programs to pursue dual degree

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 19, 2022	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 19, 2022	N/A

RESOURCES AND LINKS:
Program Website: arch.umd.edu/arch/dual-degrees-arch (http://www.arch.umd.edu/arch/dual-degrees-arch/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Architecture and Community Planning, Master of Architecture and Master of Community Planning (dual degree) (M.Arch. and M.C.P.) (p. 53)

Architecture and Historic Preservation,Master of Architecture and Master of Historic Preservation (dual degree) (M.Arch. and M.H.P.)

Path A: Advanced Standing Professional Degree Program

Course	Title	Credits
Architecture courses		
ARCH600	Integrated Design Studio V	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH601	Topical Design Studio VI	6
ARCH460	Site Analysis and Design	3
ARCH xxx	Architectural History Elective	3
ARCH700	Urban Design Studio VII	6

ARCH xxx	Elective	3
ARCH770	Professional Practice of Architecture	3
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
HISP600	History, Theory, and Practice of Historic Preservation	3
RDEV670	Negotiating Agreements & Resolving Conflicts when Developing Real Property	3
Historic Preservation courses		
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
HISP650	Historic Preservation Studio Workshop	6
HISP655	American Vernacular Architecture	3
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
Internship (Internship in Historic Preservation)		0
Total Credits		**75**

Path B: For Students with a Baccalaureate outside of Architecture

Course	Title	Credits
Architecture courses		
ARCH404	Graduate Architecture Design Studio I	6
ARCH405	Graduate Architecture Design Studio II	6
ARCH406	Graduate Architecture Design Studio III	6
ARCH407	Graduate Architecture Design IV	6
ARCH425	History of Architecture I	3
ARCH426	History of Architecture II	3
ARCH443	Visual Communication For Architects	3
ARCH445	Visual Analysis of Architecture	3
ARCH460	Site Analysis and Design	3
ARCH462	Methods & Materials of Building Construction	3
ARCH463	Sustainable Systems in Architecture	3
ARCH464	Architectural Structures I	3
ARCH465	Architectural Structures II	3
ARCH466	Environmental Systems in Architecture	3
ARCH600	Integrated Design Studio V	6
ARCH601	Topical Design Studio VI	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH654	Urban Development and Design Theory	3
ARCH770	Professional Practice of Architecture	3
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
ARCH 6xx	Architecture Elective	3
ARCH 6xx	Architecture Seminar	3
Historic Preservation courses		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
HISP650	Historic Preservation Studio Workshop	6
HISP655	American Vernacular Architecture	4
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
HISP690	Historic Preservation Professional Practice (Preservation Management and Practice)	2
Internship (Internship in Historic Preservation)		0
Total Credits		**126**

The dual degree combines course work from the Architecture and Historic Preservation programs to enable a student to complete both the Master of Architecture and Master of Historic Preservation degrees with fewer credits than it would take to complete the two separately.

Architecture and Historic Preservation (ARHP)

Graduate Certificate Program
School of Architecture, Planning and Preservation

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Fax: 301.314.9583
Email: jcwells@umd.edu

Website: http://www.arch.umd.edu **(**http://www.arch.umd.edu/**)**

Courses: ARCH (https://academiccatalog.umd.edu/graduate/courses/arch/) HISP (https://academiccatalog.umd.edu/graduate/courses/hisp/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose: In addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- GRE Subject (optional)
- Miller Analogies Test (MAT) (optional)
- Graduate Management Admission Test (GMAT) (optional)
- CV/Resume
- Writing Sample
- Portfolio PDF Upload (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationportfoliorequirementsarchardvarhparcp.pdf)
- Must be admitted by both programs to pursue dual degree

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 19, 2022	n/a
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 19, 2022	n/a

RESOURCES AND LINKS:

Program Website: arch.umd.edu (http://www.arch.umd.edu)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Architecture and Historic Preservation,Master of Architecture and Master of Historic Preservation (dual degree) (M.Arch. and M.H.P.) (p. 54)

Architecture and Real Estate Development, Master of Architecture and Master of Real Estate Development (dual degree) (M.Arch. and M.R.E.D.)

Path A: Advanced Standing for Students with a Pre-Professional Degree in Architecture

Course	Title	Credits
Architecture courses		
ARCH600	Integrated Design Studio V	6
ARCH611	Advanced Architecture Technology Seminar	3
ARCH654	Urban Development and Design Theory	3
ARCH601	Topical Design Studio VI	6
ARCH460	Site Analysis and Design	3
ARCH xxx	Architecture Elective	3
ARCH700	Urban Design Studio VII	6
ARCH797	Thesis Proseminar	3
ARCH770	Professional Practice of Architecture	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
Real Estate Development courses		
RDEV600	Principles and Practice of Real Property Development	3
RDEV603	Introduction to Real Property Finance	3
RDEV630	Real Property Finance and Investment	3
RDEV610	Real Property Development Law and Ethics	3
RDEV690	Capstone Project: Real Property Feasibility Study	3
Cognate Courses		15
Total Credits		**75**

Path B: For Students with a Baccalaureate outside of Architecture

Course	Title	Credits
Core Requirements		
ARCH404	Graduate Architecture Design Studio I	6
ARCH405	Graduate Architecture Design Studio II	6
ARCH406	Graduate Architecture Design Studio III	6
ARCH407	Graduate Architecture Design IV	6
ARCH425	History of Architecture I	3
ARCH426	History of Architecture II	3
ARCH443	Visual Communication For Architects	3
ARCH445	Visual Analysis of Architecture	3
ARCH460	Site Analysis and Design	3
ARCH462	Methods & Materials of Building Construction	3
ARCH463	Sustainable Systems in Architecture	3
ARCH464	Architectural Structures I	3
ARCH465	Architectural Structures II	3
ARCH466	Environmental Systems in Architecture	3
ARCH600	Integrated Design Studio V	6
ARCH601	Topical Design Studio VI	6
ARCH611	Advanced Architecture Technology Seminar	3

ARCH654	Urban Development and Design Theory	3
ARCH770	Professional Practice of Architecture	3
ARCH797	Thesis Proseminar	3
ARCH798	Thesis in Architecture	3
ARCH799	Master's Thesis Research	6
RDEV630	Real Property Finance and Investment	3
Architecture Elective		3
Architecture Seminar		3
RDEV600	Principles and Practice of Real Property Development	3
RDEV603	Introduction to Real Property Finance	3
RDEV610	Real Property Development Law and Ethics	3
RDEV690	Capstone Project: Real Property Feasibility Study	3
Real Estate Development Elective		3
Cognate Courses		15
Total Credits		**126**

Students entering the program with a four-year Bachelor of Science degree in Architecture from an accredited college or university normally require two years of graduate study to complete the requirements for the professional Master of Architecture degree (Path A). The dual degree curriculum requires 75 credits which can be completed in five semesters plus one Summer and one Winter term course. Additional credits may be required depending upon the architectural admissions committee's evaluation of the individual's academic and architectural experience. Information on required courses and curriculum may be found on the School of Architecture, Planning, and Preservation website at http://www.arch.umd.edu.

Students who enter the professional program with a B.A. or B.S. in a discipline other than architecture (Path B) will normally require eight semesters plus course work in 2 summer and two winter terms in order to complete the 126 credits required for the dual degree in architecture and real estate development. Students may be granted advanced standing if they have completed certain of the required architecture prerequisites. Information on required courses and curriculum may be found on the School of Architecture, Planning, and Preservation website at http://www.arch.umd.edu.

Architecture and Real Estate Development (ARDV)

Graduate Degree Program
School of Architecture, Planning and Preservation

Abstract

There are several paths, depending on prior education and experience for applicants to consider for Architecture as well as for Real Estate Development. Students applying for the dual degree program will complete fewer courses (permitted overlap of courses) than if they took each degree program separately. The total number of credits for the dual degree is 75 credits for Path A architecture/real estate development dual degree students (those with undergraduate degree credits fully accepted) and is 127 credits for Path B architecture/real estate development dual degree students (those without an undergraduate degree in architecture). For the most complete information on the architecture program, also consult the catalog entry for ARCH. For the most complete information on the real estate development program, also consult the catalog entry for RDEV.

Financial Assistance

The School of Architecture, Planning, and Preservation offers a limited and varying number of teaching and research assistantships, scholarships, fellowships, and internships. Applicants should apply for financial assistance when submitting the application for admission.

The Colvin Institute provides scholarship funds to a number of highly qualified students, who may be dual degree students each term. Scholarship determinations are made at the time of application and admission. Scholarships are generally awarded on a per course basis and commitments are made at the time of admission and apply to the entire program, subject to academic performance. Periodically there are named scholarships provided by various real estate organizations or development companies.

In addition, there are work opportunities both on, and off campus, and they are relatively plentiful. However, students in the dual degree program may find it impossible to complete their degree requirements timely if they are working off campus, or more than 10 hours per week. However, the MRED student listserv posts openings periodically as they are brought to the attention of the Program by alumni, friends, faculty and sponsors.

Applicants should inquire as to the availability of funding for the term they are starting. Colvin Institute scholarships are typically for a portion of tuition only, and are paid on a per course basis as students progress through the program.

Contact

Find additional information on program offerings, degree requirements, admissions, and financial aid on the School's Web site (www.arch.umd.edu (http://www.arch.umd.edu)).

Schedule a visit and tour online at: http://arch.umd.edu/arch/prospective-students-arch (http://arch.umd.edu/arch/prospective-students-arch/). Be sure to contact the Program Director for Real Estate Development, Maria Day-Marshall, (mdaymars@umd.edu) if you wish to attend a sampling of RDEV classes while here.

For further information about the Architecture Program, please contact Brian Kelly, AIA, Director, arch-admissions@umd.edu (https://academiccatalog.umd.edu/graduate/programs/architecture-real-estate-development-ardv/arch-admissions@umd.edu), 301.405.8000.

For further information about the Real Estate Development Program and the Colvin Institute, please contact Maria Day-Marshall, JD, LLM, Director, mdaymars@umd.edu, 301.405.8000.

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Email: arch-admissions@umd.edu (https://academiccatalog.umd.edu/graduate/programs/architecture-real-estate-development-ardv/arch-admissions@umd.edu)

Maria Day-Marshall, JD, LLM,
Clinical Associate Professor and Director
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Website: http://www.arch.umd.edu

Relationships: Historic Preservation (HISP) (p. 233), Community Planning (CMPL) (https://academiccatalog.umd.edu/graduate/programs/community-planning-cmpl/)

Courses: ARCH (https://academiccatalog.umd.edu/graduate/courses/arch/) RDEV (https://academiccatalog.umd.edu/graduate/courses/rdev/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose: In addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- GRE Subject (optional)
- Miller Analogies Test (MAT) (optional)
- Graduate Management Admission Test (GMAT) (optional)
- CV/Resume
- Portfolio PDF Upload (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationportfoliorequirementsarchardvarhparcp.pdf)
- Writing Sample
- Must be admitted by both programs to pursue dual degree.

The application process consists of the following:

- First, fill out the online application for the University of Maryland Graduate School. The administrative code for the dual degree in Master of Architecture degree and Master of Real Estate Development is "ARDV."
- Second, submit all transcripts, three professional letters of recommendation, statement of purpose, resume, official test scores, portfolio, and writing sample as part of the application.

All applicants must have a bachelor's degree from an accredited institution. There is no restriction on the applicant's previous field of study, and indeed we encourage diversity in all senses.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 19, 2022	n/a
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 19, 2022	n/a

RESOURCES AND LINKS:

Program Website: arch.umd.edu (http://www.arch.umd.edu/)
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Architecture and Real Estate Development, Master of Architecture and Master of Real Estate Development (dual degree) (M.Arch. and M.R.E.D.) (p. 56)

Facilities and Special Resources

The School of Architecture, Planning and Preservation and the Colvin Institute of Real Estate Development are ideally located between Washington, DC, and Baltimore and surrounded by a number of historic communities and a varied physical environment. The resulting opportunity for real estate development and environmental design study is unsurpassed.

The School's resources include design workstations for each architecture student, a model shop, a digital fabrication lab, and both PC and MAC computer labs with REVIT, ARGUS, GIS, Maptitude and other design programs available. The School's library contains some 57,000 monographs and 6,000 current periodicals, making it one of the major architectural libraries in the nation. The National Trust Library for Historic Preservation, housed in McKeldin Library, contains 11,000 volumes and 450 periodical titles. The Colvin Institute holds the entire library offerings of the Urban Land Institute and access to all the case studies published by ULI. The interdisciplinary National Center for Smart Growth Research and Education, based in the School, offers perspectives and opportunities to engage important issues facing urban and regional planning.

Both the Real Estate Development and Architecture Programs benefit from the strong support of the professional community, including practitioners who bring expertise into the architectural design studios as instructors, consultants, and critics. The RDEV courses are all taught by working or retired real estate professionals giving unparalleled access for students to make connections with current practice in the industry. Many architecture alumni are leaders in regional firms, while others practice as far away as New York, Los Angeles, Puerto Rico, Vancouver, London, and Shanghai.

The ULI Hines competition is open to graduate students who are pursuing real estate-related studies at universities in the United States and Canada, including programs in real estate development, urban planning, urban design, architecture and landscape architecture. In the past six

years, the University of Maryland has reached the ULI Hines finals four times, won twice (2014 & 2015) and received one honorable mention.

The award-winning Comprehensive Design Studio and Advanced Technology sequence (an integral component of the M. Arch curriculum) offers an innovative teaching-learning environment where students work with an array of consultants, exploring relationships between conceptual and technical aspects of architectural form and its assembly.

Embracing the importance of context as an integral component of the design process and advocating urban design as an essential component of architectural education, the Program has gained national and international recognition for its work in urban design, through awards and competition performance. Dual degree students are prime candidates for selection to participate in the interdisciplinary competitions supported by the School, including the national ULI Hines, the regional REIDO development competition, and the local capital area competition sponsored by NAIOP which gives the team the opportunity to present a urban (re)development solution to a large professional audience of real estate and design professions.

Study abroad opportunities augment the course of study offered in College Park. Summer study abroad programs are offered to a variety of locations including Rome, Paris, Scandinavia, Great Britain, Turkey, St. Petersburg, Egypt, Peru, and Sri Lanka. Summer and winter study opportunities are also available in conjunction with the Historic Preservation, Urban Studies & Planning, and Real Estate Development programs. A Spring Semester study abroad program is based at Kiplin Hall in Great Britain.

Dual degree students have the option to do their M.Arch thesis and MRED Capstone project in a combined fashion, with a design and development proposition supported by a committee of design and development instructors and professional advisors. These are very challenging and rewarding for students and faculty alike, but require a fair amount of advance planning on the part of both the student and faculty.

Art History and Archaeology, Master of Arts (M.A.)

Thesis only: 30 credits

For the Master's degree, the student will: complete 30 credit hours at the 600 and 700 levels (at least 9 of these credits must be 700 level seminars; 6 are for thesis research; and one course must be ARTH692); pass an advisor-approved language exam appropriate to the area studied (such as Japanese); complete a thesis that demonstrates competency in research and in original investigation; and successfully defend the thesis. Please consult the department's web site for information regarding course distributional requirements. A minimum grade of “B-” is required for all courses approved for graduate credit. Two grades below “B-” result in automatic dismissal from the program.

Course	Title	Credits
Core Requirements		
ARTH692	Methods of Art History	3
ARTH799	Master's Thesis Research	6
Select seven graduate colloquia or seminars (3 credits each) including one course from each of the following four topic areas: [1]		21
Art before 1800 (Chronological area)		
Art after 1800 (Chronological area)		
Art outside Europe and the USA (Geographical area)		
Art from Europe and/or the USA (Geographical area)		
Total Credits		**30**

1 A single course may fulfill one of the chronological areas as well as one of the geographic areas. No one course, however, can fulfill both of the chronological topic areas or both of the geographic areas.

Art History and Archaeology, Doctor of Philosophy (Ph.D.)

A total of thirty-three credit hours, after the M.A. degree, is required for the Ph.D. program. For the direct Ph.D.–in which the M.A. degree is bypassed–the student must complete a total of fifty-seven credit hours. For coursework distributional requirements, see the department's web page. A minimum grade of "B-" is required for all courses approved for graduate credit. Two grades below "B-" result in dismissal from the program.

Advance to Candidacy: In addition to the below course requirements, all doctoral students must pass two advisor-approved, field-specific foreign language exams (one of these could have been taken as an M.A. student), submit a successful request for approval of doctoral exam topics, pass both the written and oral doctoral exams, and successfully defend a dissertation proposal, and

Post-candidacy: Students must successfully defend a dissertation.

Requirements after the M.A. Degree

Course	Title	Credits
Core Requirements		
Select 18 credits of coursework		18
ARTH692	Methods of Art History (if not previously taken)	3
Dissertation Research Requirements		
ARTH899	Doctoral Dissertation Research	12
Total Credits		**33**

Requirements for Students Who Bypass the M.A. and Enter Directly into the Doctoral Program

Course	Title	Credits
Core Requirements		
Select 42 credits of coursework [1]		42
ARTH692	Methods of Art History	3
Dissertation Research Requirements		
ARTH899	Doctoral Dissertation Research	12
Total Credits		**57**

1 For coursework distributional requirements, please see the M.A. core requirements.

Art History and Archaeology (ARTH)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of Art History and Archaeology offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees in Art

History. The Program is committed to the advanced study and scholarly interpretation of works of art from the prehistoric era to the present and is grounded in the concept of art as a humanistic experience. The faculty offers expertise in all phases of the history of Western art as well as the arts of Africa, the Americas, and East Asia.

Financial Assistance

Fellowships are awarded on the basis of merit by the College of Arts and Humanities and by the Graduate School. Several graduate assistantships are awarded by the Department. Also, up to four Museum Fellowships are awarded each year by the Department of Art History and Archaeology for research at major museums in the Washington-Baltimore area. In honor of its late founding chairman, the Department has established the George Levitine Art History Endowment, in support of research activities of graduate students as well as faculty. The Jenny Rhee Fellowship supports research, travel, and other educational expenses. The Department has recently received a generous gift from the Robert H. Smith family which includes three graduate fellowships. Additional fellowships are available, including travel and dissertation research awards.

Contact

For more information on Departmental requirements and any other information, please view the Department's website, or contact the Department's Director of Graduate Studies or Coordinator of Graduate Studies.

Deborah Down
Coordinator of Graduate Studies
Department of Art History and Archaeology
1211B Parren J. Mitchell Art-Sociology Building
3834 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1487
Fax: 301.314.9652
Email: ddown@umd.edu

Website: http://www.arthistory.umd.edu

Courses: ARTH (https://academiccatalog.umd.edu/graduate/courses/arth/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample (could be a research paper)
- Description of Research/Work Experience

For admission to the Master's program, students should have an undergraduate degree from an accredited college or university, or its equivalent. Although the applicant must demonstrate a general knowledge of art history, an undergraduate major in art history is not required. Students are required to submit the Graduate Record Examination scores for admission.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 10, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 10, 2021

RESOURCES AND LINKS:
Other Deadlines: arthistory.umd.edu (http://www.arthistory.umd.edu)
Program Website: arthistory.umd.edu/academics/graduate (http://arthistory.umd.edu/graduate-program/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Art History and Archaeology, Doctor of Philosophy (Ph.D.) (p. 59)
- Art History and Archaeology, Master of Arts (M.A.) (p. 59)

Facilities and Special Resources

The Michelle Smith Collaboratory for Visual Culture, part of the Department of Art History and Archaeology, is designed to foster innovation in teaching and research by combining cutting-edge visual technology with an environment that encourages collaboration among faculty, students, and external scholars. The Collaboratory combines space for work and for meetings with advanced technology and helpful staff to provide a venue in which teachers and students can gather to work, share ideas, and find the resources necessary to explore new technologies and pursue intellectual interests, as well as to promote the department's teaching curriculum. The Department maintains its own Lloyd and Jeanne Raport study collection of some 130 objects from ancient Egypt, Greece, Rome, and the Ancient Americas.

The University Art Gallery, also located in the Parren J. Mitchell Art-Sociology Building, maintains a lively and varied exhibition schedule and has a permanent collection of twentieth-century American prints, drawings and paintings, collections of Japanese prints, and African objects.

The Art Library houses approximately 100,000 volumes as well as a vast body of auxiliary material, including about 70,000 sheets of microfiche. In addition to the University's library resources, graduate students have access to the Library of Congress, the Archives of American Art, the libraries of Dumbarton Oaks, and other research facilities in Washington.

The University of Maryland is located in the suburbs of Washington, D.C., and is 30 minutes from the National Gallery of Art and the National Gallery's Center for Advanced Study in the Visual Arts, the Corcoran

Gallery, the Phillips Collection, the Hirshhorn Museum and Sculpture Garden, the Smithsonian American Art Museum, the Museum of African Art, the Freer and Arthur M. Sackler Galleries, which are devoted to the art of East Asia, the National Museum of Women in the Arts, and many other major art museums. The campus is a 40-minute drive from such Baltimore institutions as the Walters Art Gallery and the Baltimore Museum of Art.

In order to enhance the student's curricular choices, the Department maintains an arrangement for course exchange with the Art History department of the Johns Hopkins University in Baltimore. To similar effect, the Department is a member of the Washington Area Art History Consortium, which unites the graduate art history departments of the greater Washington area.

The Department organizes a variety of liaison activities with leading cultural institutions in the Washington-Baltimore area. The Middle Atlantic Symposium in the History of Art is sponsored jointly by the Department and the National Gallery of Art; this annual event provides the opportunity for advanced graduate students from universities in the Middle Atlantic region to present their research at a professional forum. Special seminars are frequently given by curators of such local collections as the National Gallery of Art, the Freer Gallery, or the Department of Prints and Photographs at the Library of Congress.

Art Studio, Master of Fine Arts (M.F.A.)

Thesis option only: 60 credits required

Course	Title	Credits
Core Requirements		
ARTT698	Directed Graduate Studies in Studio Art (ARTT698A)	5
ARTT698	Directed Graduate Studies in Studio Art (ARTT698B)	6
ARTT699	Directed Graduate Studies in Studio Art (ARTT699A)	7
ARTT699	Directed Graduate Studies in Studio Art (ARTT699B)	4
ARTT768	Graduate Colloquium	12
ARTT798	Directed Graduate Studies in Studio Art (ARTT798A)	5
ARTT798	Directed Graduate Studies in Studio Art (ARTT798B)	6
ARTT799	Master's Thesis Research	9
Art History or Art Theory electives		6
Total Credits		**60**

Candidates for the Master of Fine Arts Degree must complete a program that consists of 60 credit hours. These 60 credit hours are distributed as follows:

- 30-33 credits in Studio;
- 0-3 credits Teaching Internships;
- 6 credits in Art History/Art Theory;
- 12 credits in Graduate Colloquium; and
- 9 credits in Masters Thesis Research.

Graduate Reviews, with committees made up of Graduate faculty members, take place at the end of each semester. Each MFA candidate in his/her final semester must select a thesis advisor and a thesis committee. Students must present their artwork in a Thesis Exhibition, usually installed in the Art Gallery at a designated time near the end of the spring semester. Students must also develop a written component to the Thesis (These have varied in length from five to 50 pages), and present an oral defense of the Thesis to the Thesis committee.

Art Studio (ARTT)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of Art offers a program of graduate study leading to the Master of Fine Arts degree. The program emphasizes independent and interdisciplinary work. The Graduate Faculty consists of 15 active professional artists specializing in a range of studio and post-studio practices, including painting/drawing, sculpture/installation, printmaking, digital and time-based media. The program is small and competitive, and most students receive support in the form of graduate fellowships and assistantships, which include teaching and after-hours studio monitoring.

Financial Assistance

The Department offers eight teaching assistantships and one fellowship. A number of Graduate School Fellowships are also available. Applications should be submitted by January 16 for consideration for a graduate assistantship or fellowship.

Contact

The Department of Art website, www.art.umd.edu provides a lot of information for prospective students. For further information, contact:

Danielle M. Curtis
Graduate Administrative Assistant
Department of Art
1211E Parren J. Mitchell Art-Sociology Building #146
3834 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1445
Email: DCurtis2@umd.edu

Shannon Collis
Professor and Graduate Director
Department of Art
1211E Parren J. Mitchell Art-Sociology Building #146
3834 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1445
Email: scollis@umd.edu

Website: http://www.art.umd.edu

Courses: ARTT (https://academiccatalog.umd.edu/graduate/courses/artt/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Digital Submission: 15-20 digital images, website/software or videos/videos documentation indicative of current artistic practice, uploaded to umdart.slideroom.com (https://umdart.slideroom.com/#/Login), $10 supplemental application fee

To apply to the MFA Program applicants are encouraged to complete the Graduate School application available online (https://gradapply.umd.edu). Applicants are also required to pay the requisite application fee.

For admission to the graduate program, The Department of Art requires an undergraduate degree with a major in art from an accredited college or university, or its equivalent. A minimum of 30 credit hours of undergraduate work in studio courses and 12 credit hours in art history courses is recommended.

The MFA Degree is the final degree in studio art. Only the highest level of undergraduate artistic achievement is appropriate for graduate application. The Department of Art seeks students who have developed coherent bodies of work that are personal and focused. This body of art work, as professionally documented on CD's, Videos or websites is the primary basis for admittance.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	February 2, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	February 2, 2022

Other Deadlines: Please visit the program website at http://www.art.umd.edu

Requirements

- Art Studio, Master of Fine Arts (M.F.A.) (p. 61)

Facilities and Special Resources

Each MFA student is provided with 24-hour access to an individual studio. Each studio is approximately 400 sq. ft. The studios are adequately ventilated and meet industry standards in safety. General sculpture facilities include: Approximately 2200 sq. ft. wood shop; approx. 2200 sq.ft. steel fabrication studio; approx. 1500 sq. ft. foundry w/indoor furnace plus outdoor furnace for iron casting. There is space within the building, and outside on the grounds, for sculpture and installations. The printmaking studio (screen, intaglio, relief/litho, digital) is approximately 3000 sq. ft. There are also approx. 8000 sq. ft. of undergraduate painting and drawing studios. Digital media features up to date Macs, large format printers, a CNC router, laser cutter/engraver, and two maker-bot 3D printers. The department encourages multi-media and interdisciplinary approaches to technology.

Within the building housing the Department of Art, there are two galleries and two libraries. The University of Maryland Art Gallery, an independent unit that works closely with the Department of Art, features national and international contemporary and historical exhibitions as well as faculty and annual MFA Thesis shows. The Herman Maril Art Gallery is a student organized gallery that features student exhibitions, lectures, special projects and a space for social activities. The Art Library, separate from the large research libraries on campus, has an outstanding collection of books, catalogues, periodicals and reproductions, all indexed on computer and CD ROM systems.

Astronomy, Master of Science (M.S.)

Thesis or Non-thesis option: 30 credits

Course	Title	Credits
Complete six of the nine principal courses:		18
ASTR601	Radiative Processes	
ASTR606	Stellar Structure and Evolution	
ASTR610	Astronomical Instrumentation and Techniques	
ASTR615	Computational Astrophysics	
ASTR620	Galaxies	
ASTR622	Cosmology	
ASTR630	Planetary Science	
ASTR670	Interstellar Medium and Gas Dynamics	
ASTR680	High Energy Astrophysics	
Thesis or non-thesis option		**12**
Thesis:		
ASTR799		
Electives approved with advisor		
Non-thesis:		
Electives approved with advisor		
Scholarly Paper		
Total Credits		**30**

Non-thesis Option

30 credits. Non-thesis option requires 30 credits of coursework including six of the nine principal Astronomy graduate courses, and at least 18 credits at the 600 level or above. Students must also submit a scholarly paper and pass a comprehensive final exam.

Candidates for the non-thesis option of the M.S. degree are required to complete 30 credits, including six of the nine principal Astronomy graduate courses (18 credits), with the remaining 12 credits consisting of classroom courses or research credits in Astronomy or supporting fields. Students are required to complete a 2nd-year project, which includes one or more scholarly papers.

Thesis Option

30 credits. Thesis option requires 30 credits of coursework including six of the nine principal Astronomy graduate courses and six credits of ASTR799.

Candidates for the thesis option of the M.S. degree (less common) are required to complete 30 credits, including 6 credits of thesis research (ASTR799) and eight graduate courses (24 credits). At least six of the courses must come from the nine principal Astronomy graduate courses. A written thesis is required and must be successfully defended in an oral examination.

Astronomy, Doctor of Philosophy (Ph.D.)

Students choose a research stream depending on their interest within the field. Courses beyond the required eight are sometimes necessary for advanced research. This will be assessed by the student's thesis committee.

Advance to Candidacy: In addition to the coursework below, students must complete and present a research project in the second year of graduate study and pass the Thesis Proposal Defense in their third year. The Thesis Proposal Defense includes a thesis proposal write-up, an oral presentation of the thesis proposal, and a questions/discussion session on topics relevant to the thesis research. Admission to candidacy is based on course work, the second-year research project, and the Thesis Proposal Defense.

Post-candidacy: Complete at least 12 credits of ASTR899 Doctoral Dissertation Research and successfully defend a dissertation.

Course	Title	Credits
Core Requirements		
Complete at least six of the following courses:		18
ASTR601	Radiative Processes	
ASTR606	Stellar Structure and Evolution	
ASTR610	Astronomical Instrumentation and Techniques	
ASTR615	Computational Astrophysics	
ASTR620	Galaxies	
ASTR622	Cosmology	
ASTR630	Planetary Science	
ASTR670	Interstellar Medium and Gas Dynamics	
ASTR680	High Energy Astrophysics	
ASTR699	Special Problems in Advanced Astronomy	1-6
or ASTR898	Pre-Candidacy Research	
ASTR695	Introduction to Research	1
Dissertation Research Requirements		
ASTR899	Doctoral Dissertation Research	12
Total Credits		**32-37**

Astronomy (ASTR)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

ABSTRACT

The Department of Astronomy offers a program of study leading to a Doctor of Philosophy degree. Students typically earn a Master of Science after completing the program's second year. A full schedule of courses covering most fields of astronomy is offered. Some areas in which the faculty focus their research efforts are comets, interplanetary dust, planetary dynamics, extrasolar planets, star and planet formation, mm wavelength astronomy, the interstellar medium, black holes, active galaxies, time-domain astronomy, galaxy formation and evolution, plasma astrophysics, high energy astrophysics, theoretical and computational astrophysics, and cosmology.

FINANCIAL ASSISTANCE

The Department of Astronomy offers both teaching and research assistantships. Students making adequate progress toward degree completion will receive up to six years of funding through teaching and/or research assistantships. Research assistantships are either with faculty in the Department or with staff members at the NASA/Goddard Space Flight Center or other local astronomical research centers.

Contact

Graduate Entrance Committee
Department of Astronomy
1113 Physical Sciences Complex
4296 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3001
Fax: 301.314.9067
Email: astro-grad@astro.umd.edu

Website: http://www.astro.umd.edu

Courses: ASTR (p. 626)

Relationships: Physics (PHYS) (p. 321)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- GRE Subject (Physics) (optional)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationastr.pdf)
- Description of Research/Work Experience: 1-2 page description of research and relevant work experience. It should include the topic of research, where it took place and who supervised it, the description of the actual activity (for example, “data reduction for a ground-based optical FTS instrument, wrote reduction software in Python”), whether

there were resulting publications, what you learned from pursuing this activity, and what motivated you to pursue it. Note: Please do not upload documents for the Writing Samples. (The admissions committee will not read these.)
- Faculty of Interest: applicants are asked to select a minimum of 3 tenured/tenure-track faculty members *(*http://www.astro.umd.edu/people/directory.html#Tenured/Tenure-Track%20Faculty*)*.

Because of the large number of qualified applicants, the Department of Astronomy has had to restrict formal admission to the Graduate School to those who have shown particularly outstanding work in their undergraduate records.Students who enter the graduate program are normally expected to have strong backgrounds in astronomy, physics, and mathematics (equivalent to a B.S. in Astronomy or Physics). A student with deficiencies in one of these areas may be admitted but will be expected to remedy such deficiencies as soon as possible.

- In our admission process, we are looking for students who will thrive and succeed in our program, and who will be productive and active members of our graduate student community. To evaluate this we take into account all of the information you include in the application. Good academic preparation is needed for success in any graduate program; this can be demonstrated in a number of ways, such as good grades especially in appropriate-level physics and math classes, or with the Physics GRE test (which is an optional component of the application package and will not count against you if not submitted). As you work on your application materials, consider that we are very interested in understanding not only what you have done, but also what you have learned as part of your classes and research experience.

Note that the Department of Astronomy accepts applications for the Ph.D. program only. (Admitted students typically receive an M.S. degree after their second year in the program.) For full details, see http://www.astro.umd.edu/graduate/admissions.html

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 15, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 15, 2021

RESOURCES AND LINKS:

Other Deadlines: astro.umd.edu (http://www.astro.umd.edu)
Program Website: astro.umd.edu/graduate/admissions (http://www.astro.umd.edu/graduate/admissions.html)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Astronomy, Doctor of Philosophy (Ph.D.) (p. 63)
- Astronomy, Master of Science (M.S.) (p. 62)

Facilities and Special Resources

The Department has guaranteed observing time on the 4.3-meter Discovery Channel Telescope through a partnership with Lowell Observatory. We have strong interactions with other major observatories, where many students and faculty maintain observing programs, and with neighboring scientific institutes, including the Naval Observatory, the Naval Research Lab, and other government agencies. We have joined with Caltech and other partners in the Zwicky Transient Facility, a time-domain survey for studying rare and exotic transient phenomena which will see first light at Palomar Observatory in 2017. Our planetary science team is heavily involved with space missions visiting solar system bodies, such as NASA's Deep Impact, EPOXI, and Rosetta missions to study comets.

The Center for Research and Exploration in Space Science & Technology II (CRESST II) is the most visible of our many interactions with NASA's Goddard Space Flight Center, located only 5 miles away. UMD researchers work together with Goddard scientists on many topics, ranging from the study of neutron stars, black holes, and extremely hot gas throughout the universe to the study of planets in our Solar System. This partnership offers an exciting array of opportunities for graduate students to work with Goddard scientists and facilities on their Ph.D. theses.

U. Maryland and NASA's Goddard Space Flight Center formed the Joint Space-Science Institute (JSI), a close collaboration between the Departments of Astronomy and Physics and NASA/Goddard. JSI's areas of investigation include black hole physics, high-energy astrophysics, and cosmology.

The Department has also established a partnership with Pontificia Universidad Catolica de Chile (PUC). PUC, one of the top two institutions for astronomy in Chile, signed an agreement with UMD in 2010 that enables astronomy graduate students at both institutions to participate in a joint Ph.D. program starting in their third year. These students split their time between both locations and conduct their thesis research under the supervision of UMD and PUC co-advisors. UMD students gain improved access to Chilean observatories, which include many of the best telescopes in the world.

The Center for Theory and Computation (CTC), a strong group of theoretical astrophysicists within the department, built and maintains a Beowulf cluster to perform computational analyses and simulations across a range of research areas. We also have access to three larger university clusters, including the world-class "DeepThought2" and "MARCC/Bluecrab", which have been invaluable to our students in completing computationally-intensive thesis projects.

In 2014, much of the Department moved to the new Physical Sciences Complex (PSC). Highlights of the building include beautiful architecture, windowed office space for grad students, a grad student lounge, and a state-of-the-art visualization lab for state-of-the-art simulations and displays of large datasets.

This Department is associated with the following research units and facilities:

- Center for Research and Exploration in Space Science and Technology II (CRESST II) (http://cresst.umd.edu/): Partnership

between UMCP, UMBC, USRA, and NASA/Goddard, with an emphasis on high-energy astrophysics.

- Joint Space Science Institute (JSI) (https://jsi.astro.umd.edu/): Partnership between Astronomy, Physics, and NASA/Goddard, with an initial emphasis on high energy astrophysics, especially black holes. Established 2010.
- Laboratory for Millimeter Wave Astronomy (LMA) (http://www.astro.umd.edu/rareas/lma/)
- Center for Theory and Computation (CTC) (http://www.astro.umd.edu/rareas/ctc/): Astronomy Dept. center for theory- and computation-related research programs.
- Discovery Channel Telescope (DCT) (http://www.astro.umd.edu/facilities/dct.html)
- Zwicky Transient Facility (ZTF) (https://www.ptf.caltech.edu/ztf/)
- PDS Small Bodies Node (https://pds-smallbodies.astro.umd.edu/) (https://www.ptf.caltech.edu/ztf/)

Atmospheric and Oceanic Science, Master of Science (M.S.)

Non-thesis only (scholarly paper required): 30 credits

Course	Title	Credits
Core Requirements		
AOSC610	Dynamics of the Atmosphere and Ocean I	3
AOSC611	Dynamics of the Atmosphere and Oceans II	3
AOSC620	Physics and Chemistry of the Atmosphere I	3
AOSC621	Physics and Chemistry of the Atmosphere II	3
AOSC680	Introduction to Earth System Science	3
AOSC617	Atmospheric and Oceanic Climate	3
Electives		12
Total Credits		**30**

The Atmospheric and Oceanic Science Department offers a non-thesis program leading to the Master of Science Degree. This program provides fundamental training to prepare students for research and operational work in the atmospheric and oceanic sciences. Each new student will be assigned to a faculty advisor whose interests parallel those of the student. The faculty advisor will assist in the development of the student's course program and will follow the student's progress thereafter. The student may select an alternate advisor at any time, although financial support is dependent upon the availability of funds.

A minimum of 30 semester hours of coursework is required for the degree program. This must include 24 hours of 600-level AOSC courses, including the listed core courses. The remaining 6 semester-hours can come from additional 600-level courses, including up to 3 from AOSC798.

Students must write a Scholarly Paper in the final semester that demonstrates their ability to conduct original and/or literature-based research. The student's advisor and the Graduate Director will evaluate and approve the Scholarly Paper. Once approved, the student will orally present the scholarly paper findings at the AOSC Student Seminar. Students are additionally required to attend the weekly Department seminars.

The paper will become part of the permanent archive of the Department. A Ph.D. dissertation prospectus will satisfy this requirement but you must use the appropriate scholarly paper format when submitting to the Graduate Director.

All requirements for the M.S. degree must be completed within a five-year period. This time limit applies to any transfer work from other institutions [6 credits maximum] to be included in the student's program. A full-time student can easily complete the M.S. degree in two years.

Atmospheric and Oceanic Science, Doctor of Philosophy (Ph.D.)

This program is designed to furnish the student with the background necessary to carry out independent and original scientific research. To earn the Ph.D., the student must complete a course work requirement, pass the Candidacy Examinations, and prepare and defend a dissertation. Doctoral students are required to complete the M.S. course requirements. In addition, doctoral students are required to attend the weekly department seminar series.

A student seeking a Ph.D. degree will be assigned to a faculty advisor whose interests parallel those of the student. The academic advisor will establish and chair an advising committee which will oversee the student's degree program.

Students may wish to take a number of the core courses in order to prepare for the Qualifying Examination. In addition, there is a Minor course requirement of six semester hours of ancillary courses taken beyond the bachelor's degree in a related scientific area at the 600-level or above. These credits must have a unified or coherent theme. Students may petition the Department for a waiver of a portion of these requirements based on credits earned at another institution at the graduate level.

Advancement to Candidacy: In addition to the course requirements, students must pass the Candidacy Examinations, which are divided into two parts - The Qualifying Examination and the Specialty Examination. During the Specialty Examination, the student must present and defend a dissertation prospectus to the examination committee. Following successful defense, the student advances to candidacy.

Full-time students are expected to complete the Qualifying Examination by the end of the second year of graduate study and be admitted to candidacy by the end of the third year. Students must be admitted to candidacy within three years after admission to the doctoral program and at least six months before the date on which the degree will be conferred.

Post-Candidacy: Ability to perform independent research must be demonstrated by a written dissertation. The dissertation should be an original contribution to knowledge and demonstrate the ability to present the subject matter in a scholarly style. Upon completion of the dissertation the candidate is required to present the research results at an Atmospheric and Oceanic Science Department seminar and to defend the material to the satisfaction of a Final Examining Committee appointed by the Dean for Graduate Studies.

The candidate must present an open seminar on his/her past research followed by a closed oral exam by the Examination Committee of at least three faculty plus the Graduate Director, and the Admissions Committee Chair. Two or more negative votes constitutes failure. The final decision will be subject to review by the committee of the whole.

The student must complete the entire program for the degree, including the dissertation and final examination, during a four-year period after admission to candidacy.

Course	Title	Credits
Core Requirements		
Select 30 semester hours of 600-level or above AOSC Department courses		30
Dissertation Research Requirements		
AOSC899	Doctoral Dissertation Research	12
Total Credits		**42**

Graduate Track for Accomplished Scientists

Graduate students with exceptional scientific achievements may, through written petition to the Graduate Director, replace the written portion of the Comprehensive Exam with a seminar followed by an oral examination. To qualify for this track, the candidate needs to meet the following requirements:

1. have an earned MS degree in atmospheric or oceanic science, or a related field, ordinarily from an accredited American university, and receive approval from the five-member Departmental Examination Committee.
2. have published at least five, peer-reviewed, Science Citation Index (SCI) journal articles in atmospheric, oceanic, or a closely related science. He or she must be the lead or corresponding author of at least three of those papers.

Atmospheric and Oceanic Science (AOSC)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Department of Atmospheric and Oceanic Science offers graduate study leading to the Master of Professional Studies, Master of Science, and Doctor of Philosophy degrees. Coursework in atmospheric and oceanic sciences is also offered at the upper division and graduate level as a service to other campus graduate programs. The educational program is broadly based and involves many applications of the mathematical, physical and applied sciences that characterize modern atmospheric sciences and physical oceanography, including climate and earth system science, and multidisciplinary studies of the interrelationship among the atmosphere, the oceans, the land, and the biota. The Department's advanced degree programs are designed to prepare students for participation in contemporary research in the atmospheric and oceanic science. Research specializations include: atmospheric dynamics; atmospheric chemistry; physical oceanography; air pollution; atmospheric radiative transfer; remote sensing of the atmosphere, ocean, and land; climate variability and change; data assimilation; numerical weather prediction; severe storms; surface-atmosphere, ocean-atmosphere and biosphere-atmosphere interactions; and earth system modeling. The curriculum includes a set of Core courses to provide a fundamental background in atmospheric and oceanic dynamics, physical meteorology and atmospheric chemistry, earth system science and climate, as well as advanced specialized courses. Supervised research using state-of-the-art facilities then prepares the students for future contributions in their chosen field.

The Department's close association with federal agencies in the Washington area provides graduate students with good training and opportunities in atmospheric and oceanic science. As a research assistant, the student has the opportunity to develop a close working relationship with one or more of the scientific agencies.

Financial Assistance

Graduate research and teaching assistantships are available to qualified graduate students. Research assistants carry out research in the areas of physical and dynamic meteorology, physical oceanography, data assimilation, remote sensing, atmospheric chemistry, air pollution, climate dynamics, atmospheric radiation, severe storms, cryosphere, global climate change, and ocean-atmosphere and atmosphere-biosphere interactions. Fellowships are also awarded by the Graduate School to the most qualified applicants. In addition, hourly employment is available in the Department and off campus. Stipends are maintained at a competitive level.

Contact

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Department of Atmospheric and Oceanic Science
3405 Atlantic Building
4254 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5389
Fax: 301.314.9482
Email: tbarksda@umd.edu

Website: http://www.aosc.umd.edu

Courses: AOSC (https://academiccatalog.umd.edu/graduate/courses/aosc/)

Admissions

GENERAL REQUIREMENTS

- Statement of Research Interests
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume (optional)
- Description of Research/Work Experience

In addition to the requirements of the Graduate School, the department requires a Bachelor's or higher degree in meteorology, oceanography, physics, chemistry, mathematics, biology, engineering or other program with suitable emphasis in the sciences. We welcome applications from those with no background in atmospheric sciences. The Core courses offered in the first year of study present students with the necessary background in atmospheric and oceanic science for the more advanced courses. The minimum undergraduate background includes 3 semesters of calculus, differential equations, linear algebra, 3 semesters of calculus-based physics, and 2 semesters of chemistry, one semester of computer

programming. Scores from the GRE General Examination are also required.

For information on the Master of Professional Studies in Atmospheric and Oceanic Science (http://apps.gradschool.umd.edu/Catalog/public-programs-detail.php?MPAO), please see its listing in the Graduate Catalog (http://apps.gradschool.umd.edu/Catalog/public-programs-detail.php?MPAO).

Note: Applicants must get approval from the AOSC Department to apply to the Spring semester.

The fall admission deadline for priority/funding is January 17 for both domestic and international students. The fall admission deadline for funding is February 1 for both domestic and international students. Final fall admission deadlines are May 17 for domestic students and March 15 for international students.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 1, 2021

RESOURCES AND LINKS:

Other Deadlines: aosc.umd.edu (http://www.aosc.umd.edu)
Program Website: atmos.umd.edu/education/ms_phd (http://www.atmos.umd.edu/education/ms_phd.php)
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Atmospheric and Oceanic Science, Doctor of Philosophy (Ph.D.) (p. 65)
- Atmospheric and Oceanic Science, Master of Science (M.S.) (p. 65)

Facilities and Special Resources

The Department participates in the Earth System Science Interdisciplinary Center (ESSIC) and the Cooperative Institute for Climate Studies (CICS). These institutions conduct research, and offer opportunities for graduate research beyond those offered by the department faculty. In addition, the Department maintains close research and teaching associations with Departments of Mathematics and Chemistry, as well as the Institute for Physical Science and Technology (IPST), Center for Scientific Computation and Mathematical Modeling (CSCAMM), and nearby government agencies including NOAA, NASA, ONR, USDA, NIST, and Marylands Department of the Environment and Department of Natural Resources. Special facilities that support the Department's teaching and research activities include sophisticated computing facilities allowing access to a variety of atmospheric and oceanographic datasets, a laboratory for atmospheric chemistry, a mobile air pollution laboratory, access to research aircraft, a variety of supercomputers, radar, windprofiler at Fort Meade, historical data. Most importantly the students are encouraged to exploit the resources of the nearby government laboratories: NASA Goddard Space Flight Center, NOAA National Centers for Environmental Prediction.

The Department maintains a specialized library with several hundred text and reference books in meteorology and allied sciences, specialized series of research reports, and many journals. The campus provides a main library as well as specialized libraries in chemistry, astronomy, and engineering. Several excellent government libraries in the area, including the Library of Congress, the NASA Goddard Space Flight Center, the National Archives, and the NOAA libraries provide unsurpassed resources.

The University of Maryland is located in an area of unparalleled professional resources. Because of its proximity to the nation's capital, The University of Maryland is able to interact closely with the many governmental groups interested in various aspects of the atmospheric, oceanic and earth system sciences. Scientists from government laboratories participate in many aspects of graduate education, such as giving lectures in classes, presenting research results in seminars, and serving on dissertation committees. Likewise, the Department faculty often attend and participate in the seminars, colloquia and scientific workshops being held at these neighboring institutions.

The Washington, D.C. chapter of the American Meteorological Society consists of about 400 members who hold professional meetings each month. The Washington, D.C. area is frequently the site of national and international conferences, most notably of the American Association for the Advancement of Science and the American geophysical Union. In addition to the various government and academic institutions, the Washington metropolitan area contains numerous well-known private contractors and consulting companies involved in meteorology and oceanography, which provide employment opportunities for students both before and after graduation.

As a member of the University Corporation for Atmospheric Research, the department enjoys the common facilities offered by the National Center for Atmospheric Research such as research aircraft and supercomputers.

Atmospheric and Oceanic Science Technology, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits

Course	Title	Credits
Core Requirements		
Select two out the following three certificate programs:		24
Computational Methods in Atmospheric and Oceanic Science:		
AOSC630	Statistical Methods in Meteorology and Oceanography	
AOSC652	Analysis Methods in Atmospheric and Oceanic Science	
Select two additional courses approved by advisor		
General Atmospheric and Oceanic Science:		
AOSC431	Atmospheric Thermodynamics	
or AOSC610	Dynamics of the Atmosphere and Ocean I	
AOSC432	Dynamics of the Atmosphere and Ocean	
or AOSC611	Dynamics of the Atmosphere and Oceans II	
AOSC617	Atmospheric and Oceanic Climate	

AOSC670	Physical Oceanography	
Air Quality Science and Technology:		
AOSC600	Synoptic Meteorology I	
AOSC624	Remote Sensing of Surface Climate	
AOSC637	Course AOSC637 Not Found	
AOSC633	Atmospheric Chemistry and Climate	
Select two courses from the remaining certificate program		6
Total Credits		**30**

Master of Professional Studies (MPAO) The Master of Professional Studies in Atmospheric and Oceanic Science is designed for meteorologists, oceanographers and environmental scientists who need cutting-edge skills and knowledge in atmospheric and oceanic science, in the computational methods used in our field, and in air quality science. The Director of Professional Studies will advise students in planning his or her course of study, and will provide career advice and The degree is earned by successful completion of ten 3-credit courses. Students must complete two out of the following three Certificate programs, each of which consists of four courses, plus two courses from the remaining Certificate Program. The MPAO program is designed with the needs of working professionals in mind, and can be completed on a part-time basis over no more than 5 years, or on a full-time basis in 1 year and one semester.

Atmospheric and Oceanic Science Technology (MPAO)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Contact

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Telephone: 301.405.5389
Fax: 301.314.9482
Email: tbarksda@umd.edu

Website: http://www.aosc.umd.edu

Courses: AOSC (https://academiccatalog.umd.edu/graduate/courses/aosc/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (2)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	August 20, 2021	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	March 12, 2021	N/A

RESOURCES AND LINKS:

Other Deadlines: aosc.umd.edu (http://www.aosc.umd.edu/)
Program Website: atmos.umd.edu/education/professional (http://www.atmos.umd.edu/education/professional.php)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Atmospheric and Oceanic Science Technology, Master of Professional Studies (M.P.S.) (p. 67)

Atmospheric and Oceanic Science, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Core Requirements		
AOSC431	Atmospheric Thermodynamics	3
or AOSC610	Dynamics of the Atmosphere and Ocean I	
AOSC432	Dynamics of the Atmosphere and Ocean	3
or AOSC611	Dynamics of the Atmosphere and Oceans II	
AOSC617	Atmospheric and Oceanic Climate	3
AOSC670	Physical Oceanography	3
Total Credits		**12**

Atmospheric & Oceanic Science (Z046)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

*This program is not currently accepting applications.

Contact

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Email: tbarksda@umd.edu

Website: http://www.aosc.umd.edu

Courses: AOSC (https://academiccatalog.umd.edu/graduate/courses/aosc/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.aosc.umd.edu

Requirements

- Atmospheric and Oceanic Science, Post-Baccalaureate Certificate (P.B.C.) (p. 68)

Beekeeping, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Core Requirements		
ENTM745	Bee Biology and Beekeeping	3
ENTM746	Commercial Beekeeping	3
ENTM747	Pollinator Health	3
ENTM751	The History and Culture of Bees and Beekeepers	3
Total Credits		**12**

In this 12-credit certificate, students learn about the anatomy, physiology, and ecology of the honeybee, how to construct and maintain a hive, and best practices for maintaining a healthy colony.

Beekeeping (Z088)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

ABSTRACT

The Graduate Certificate in Beekeeping (GC-Beekeeping) is a 12-credit graduate program that can be completed in twelve months of continuous study. The GC-Beekeeping focuses on the anatomy, physiology, and ecology of the honeybee. Students are taught how to construct and maintain a hive and best practices for maintaining a healthy colony.

Contact

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Website: http://oes-entm.umd.edu/

Relationships: Applied Entomology (MPAE) (p. 46), Integrated Pest Management (Z089) (p. 254), Organic and Sustainable Agriculture (Z090) (p. 317), Urban Agriculture (Z091) (p. 407)

Admissions
GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Bachelor's degree in a biological field (exceptions can be made with work experience in a biological field and strong letters of recommendation)

- GPA of 3.0 or higher (exceptions can be made with work experience in a biological field and strong letters of recommendation)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	August 19, 2022	February 18, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	August 19, 2022	February 18, 2022

RESOURCES AND LINKS:
Program Website: oes-entm.umd.edu (http://oes-entm.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Beekeeping, Post-Baccalaureate Certificate (P.B.C.) (p. 69)

Behavioral and Community Health, Doctor of Philosophy (Ph.D.)

The PhD in Behavioral and Community Health is an 82 credit program depending on the number of course requirements that can or cannot be waived. This is a research-intensive degree that prepares students for individual research that results in a dissertation.

Advance to Candidacy: In addition to the coursework below, students must also pass a Qualifying Exam.

Post-candidacy: Students must complete at least 12 credits of HLTH899 Doctoral Dissertation Research and successfully defend a dissertation.

Course	Title	Credits
Core Requirements		
SPHL600	Foundations of Public Health	3
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL611	Public Health Ethics	1
or SPHL612	Research Ethics	
MIEH600	Foundations of Environmental Health	3
HLSA601	Introduction to Health Systems	3
EPIB697	Public Health Data Management	3
Advanced EPIB course		3
HLTH609	Public Health Journal Club	1
HLTH625	Community Assessment through Qualitative Methods	3
HLTH665	Health Behavior I	3
HLTH672	Public Health Informatics	3
HLTH710	Methods and Techniques of Research	3
HLTH776	Community Health Program Evaluation	3
HLTH780	Community Health	3
HLTH666	Health Behavior II	3
HLTH652	Quantitative Research Methods I in Public health	3
HLTH653	Quantitative Research Methods II in Public Health	3
HLTH711	Advanced Research Methods in Health	3
HLTH712	Applied Research Methods in Behavioral and Community Health	3
HLTH898	Pre-Candidacy Research	6
Electives		9
Dissertation Research Requirements		
HLTH899	Doctoral Dissertation Research	12
Total Credits		**82**

Behavioral and Community Health (BCHL)

Graduate Degree Program
College: Public Health

Abstract

The Department offers graduate study leading to the Master Public Health (MPH) in Behavioral and Community Health and the Doctor of Philosophy degree in Behavioral and Community Health. The graduate programs are designed to prepare behavioral and community professionals with specific skills and the ability to implement theoretical knowledge in a practical setting.

The goal of the doctoral program is to develop health professionals competent in understanding the health needs of populations who are qualified to conduct research in order to implement programs and policies aimed at improving the public's health. This program is very selective and admission is competitive. The program provides students with the opportunity to develop research skills essential in making significant contributions to the scientific and professional literature in behavioral and community health.

Degree programs may be completed either full-time or part-time, although full-time is preferred. Faculty support coursework, research and practice experiences in many areas, including: health communication; health behavior; adolescent health; women's health; health literacy and health disparities. Faculty hold doctoral degrees in public health, psychology, health education, sociology and epidemiology. The Department offers excellent research and laboratory facilities including the Center for Young Adult Health and Development and the Prevention Research Center.

Financial Assistance

The Department offers a limited number of fellowships, and graduate teaching and research assistantships. Please contact the Director of Graduate Studies for further information.

Contact

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Director of Graduate Studies
Department of Behavioral and Community Health
1234V School of Public Health Building
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University of Maryland

College Park, MD 20742
Telephone: 301.405.2464
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Email: ksharp1@umd.edu

Website: http://www.sph.umd.edu/bch (http://www.sph.umd.edu/bch/)

Courses: HLTH (https://academiccatalog.umd.edu/graduate/courses/hlth/) SPHL (https://academiccatalog.umd.edu/graduate/courses/sphl/)

Relationships: Epidemiology (EPDM) (p. 194), Health Administration (HLSA) (p. 224), Maternal and Child Health (MCHS) (p. 285)

Admissions

GENERAL ADMISSION REQUIREMENTS

- Minimum 3.0 undergraduate GPA
- Transcripts from all previous coursework
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose and objectives including career and educational goals, professional experience, and research areas of interest

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS Application (https://sophas.org/)
- The Ph.D. in Behavioral and Community Health program has a two-step application process. Applicants first submit the SOPHAS application (www.sophas.org), the centralized application service for schools and programs of public health (Step 1). Once the SOPHAS application has been verified applicants will submit their UMD Supplemental application (Step 2). Applicants will receive an email from the SPH Admissions team with instructions for how to complete the UMD Supplemental application. Applications will not be reviewed until both the SOPHAS and UMD Supplemental applications are completed.

For detailed instructions on how to submit your application, please visit the School of Public Health Website: (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/))

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 10, 2021 (priority)
	March 11, 2022 (final)
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 10, 2021 (priority)
	March 11, 2022 (final)

RESOURCES AND LINKS:

Program Website: sph.umd.edu/department/bch (https://sph.umd.edu/department/bch/)

Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Behavioral and Community Health, Doctor of Philosophy (Ph.D.) (p. 70)

Facilities and Special Resources

The Department has research specializations in a variety of areas including:

- Minority health/social inequalities in health
- Alcohol and drug abuse
- Safety and health
- Sexual health
- Adolescent health and risk behavior
- Violence prevention/community violence
- Public health communication
- Health literacy
- Treatment of nicotine dependence

Specialized laboratories operating within the Department include:

- The Center for Young Adult Health and Development
- The Prevention Research Center
- The Center for Health Behavior Research

The proximity of the nation's capital, the National Institutes of Health, the National Library of Medicine, and Food and Drug Administration, the Maryland Department of Health and Mental Hygiene, and numerous public health focused private and not-for-profit organizations/agencies render the University of Maryland unusually well suited for graduate work in behavioral and community health.

Behavioral and Community Health, Master of Public Health (M.P.H.)

Non-thesis option only: 45 credits

The MPH in Behavioral and Community Health is a 45-credit program which includes coursework, an internship, and a MPH project. It takes 2 years to complete as a full-time student and 3.5-5.0 years to complete as a part-time student. The program cannot be completed in less than 2 years due to limited course availability. At this time, the majority of courses are held in-person on the College Park campus, a few are online.

Course	Title	Credits
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1

SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
HLTH625	Community Assessment through Qualitative Methods	3
HLTH665	Health Behavior I	3
HLTH672	Public Health Informatics	3
HLTH710	Methods and Techniques of Research	3
HLTH780	Community Health	3
HLTH778	Internship in Public Health	4
HLTH786	Capstone Project in Public Health	3
Electives		9
Total Credits		**45**

Behavioral and Community Health (MBCH)

Graduate Degree Program
College: Public Health

Abstract

The Department offers graduate study leading to the Master Public Health (MPH) in Behavioral and Community Health and the Doctor of Philosophy degree in Behavioral and Community Health. The graduate programs are designed to prepare behavioral health professionals with specific skills and the ability to implement theoretical knowledge in a practical setting.

The mission of the MPH program is to promote the development of behavioral and community health professionals who understand the science, theory, and practice of public health and can apply this knowledge toward the enhancement of health status of communities. The MPH program is designed as a professional degree to prepare behavioral and community health professionals working in public health service as practitioners, administrators, supervisors, educators, consultants, and researchers. Students will participate in both academic and applied training in program planning and implementation, program evaluation, public policy analysis, research, and management.

Degree programs may be completed either full-time or part-time. All classes are held from in the late afternoon and evening typically starting at 4:00pm or later Monday through Friday. Faculty support coursework, research and practice experiences in many areas, including: health communication; health behavior; adolescent health; women's health; health literacy and health disparities. Faculty hold doctoral degrees in public health, psychology, health education, sociology, and epidemiology. The Department offers excellent research and laboratory facilities including the Center for Young Adult Health and Development, Laboratory for Health Behavior Assessment and Intervention and The Center for Health Behavior Research.

Financial Assistance

The Department offers a limited number of fellowships, and graduate teaching and research assistantships. Contact the Director of Graduate Studies for further information.

Contact

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Website: http://www.sph.umd.edu/bch **(**http://www.sph.umd.edu/bch/**)**

Courses: HLTH (https://academiccatalog.umd.edu/graduate/courses/hlth/) SPHL (https://academiccatalog.umd.edu/graduate/courses/sphl/)

Relationships: Epidemiology (EPID) (p. 195), Health Administration (HLSA) (p. 224), Maternal and Child Health (MCHS) (p. 285)

Admissions

GENERAL ADMISSION REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS Application (https://sophas.org/): Applications for this School of Public Health Program must first be submitted through the Public Health application system, www.SOPHAS.org. SPH applicants should only complete the UMD application after their SOPHAS application has been verified and you have been notified to complete the UMD application.
- Graduate Record Examination (GRE)
- The MPH in Behavioral and Community Health program has a two-step application process. Applicants first submit the SOPHAS application (www.sophas.org), the centralized application service for schools and programs of public health (Step 1). Once the SOPHAS application has been verified applicants will submit their UMD Supplemental application (Step 2). Applicants will receive an email from the SPH Admissions team with instructions for how to complete the UMD Supplemental Application. Applications will not be reviewed until both the SOPHAS and UMD Supplemental applications are completed.

For detailed instructions on how to submit your application, please visit the School of Public Health Website: (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/))

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 17, 2021 (priority SOPHAS) / January 14, 2022 (priority UMD Supplemental)
	May 6, 2022 (final SOPHAS) / June 3, 2022 (final UMD Supplemental)
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 17, 2021 (priority SOPHAS) / January 14, 2022 (priority UMD Supplemental)
	February 11, 2022 (final SOPHAS) / March 11, 2022 (final UMD Supplemental)

RESOURCES AND LINKS:

Program Website: sph.umd.edu/department/bch/mph-behavioral-and-community-health (https://sph.umd.edu/department/bch/mph-behavioral-and-community-health/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Behavioral and Community Health, Master of Public Health (M.P.H.) (p. 71)

Facilities and Special Resources

The Department has research specializations in a variety of areas including:

- Minority health/social inequalities in health
- Alcohol and drug abuse
- Safety and health
- Sexual health
- Adolescent health and risk behavior
- Violence prevention/community violence
- Public health communication
- Treatment of nicotine dependence

Specialized laboratories operating within the Department include:

- The Prevention Research Center
- The Center for Health Behavior Research
- The Center for Young Adult Health and Development

The proximity of the nation's capital, the National Institutes of Health, the National Library of Medicine, the Food and Drug Administration, the Maryland Department of Health and Mental Hygiene, and numerous public health focused private and not-for profit organizations/agencies render the University of Maryland unusually well suited for graduate work in behavioral and community health.

Biochemistry, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option: 30 credits

Course	Title	Credits
Core Requirements		
BCHM671	Protein Chemistry and Enzymic Catalysis	3
BCHM675	Biophysical Chemistry	3
BCHM661	Nucleic Acids I	2
BCHM662	Nucleic Acids II	2
Thesis or Non-Thesis Requirements		
Select one of the following options:		20
Thesis (p. 73)		
Non-thesis (p. 73)		
Total Credits		**30**

The M.S. degree program offers both the thesis and non-thesis options. The thesis option requires an oral defense of the thesis. Specific regulations are available from the Department of Chemistry and Biochemistry or from: www.chem.umd.edu/graduateprogram/ (http://www.chem.umd.edu/graduateprogram/)

Thesis Option

Thesis option requires 24 credits of coursework (including core courses) with at least 12 credits at the 600 level or higher. In addition, students must complete six credits of BCHM799. Students are also required to present one seminar

Non-Thesis Option

Non-thesis option requires 30 credits of coursework (including core courses) with at least 18 credits at the 600 level or higher. This coursework should include six credits of BCHM699. Students are also required to submit a scholarly paper

Biochemistry, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 21 credits of coursework, with 19 credits completed by the end of the fourth semester.

Advance to Candidacy: In addition to the coursework below, students must pass an oral defense of a written research proposal, presentation of a seminar, complete an independent research proposal.

Post-Candidacy: Students must complete 12 credits of BCHM899 Doctoral Dissertation Research and successfully defend a publication-quality dissertation that advances the field.

Course	Title	Credits
Core Requirements		
BCHM671	Protein Chemistry and Enzymic Catalysis	3
BCHM675	Biophysical Chemistry	3
BCHM661	Nucleic Acids I	2
BCHM662	Nucleic Acids II	2
BCHM699	Special Problems in Biochemistry	2
BCHM677	Computational Tools in Biochemistry	1

BCHM889	Seminar	2
BCHM698	Literature Seminar in Biochemistry	2
Electives with advisor approval (minimum of 4 credits)		4
Dissertation Research Requirements		
BCHM899	Doctoral Dissertation Research	12
Total Credits		**33**

Specific regulations are available from the Department of Chemistry and Biochemistry or from: www.chem.umd.edu/graduateprogram/phdinbiochemistry/ (http://www.chem.umd.edu/graduateprogram/phdinbiochemistry/)

Biochemistry (BCHM)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Graduate Program in Biochemistry offers study leading to Doctor of Philosophy and Master of Science degrees. The program emphasizes intensive mentoring, formal and informal training in presentation skills, scientific writing, bioinformatics, teaching chemistry and biochemistry, and professional ethics. Research specialization is available in protein structure, dynamics, and function; protein-protein and protein-nucleic acid interaction; protein and nucleic acid biochemistry; RNA and DNA structure, dynamics, interactions, and function; macromolecular folding and supramolecular assembly; biomolecular nuclear magnetic resonance spectroscopy, X-ray crystallography; proteomics, metabolomics mass spectrometry; membrane proteins, protein-lipid interaction, membrane structure and function; carbohydrate chemistry, glycobiology; immunology; bio-organic chemistry; post-translational protein modification and signaling; metabolic regulation; enzyme mechanisms; drug metabolism. Several of the biochemistry program faculty are members of the Institute for Bioscience and Biotechnology Research (IBBR) or other Related Programs and Campus Units listed below. Further information about the Biochemistry Graduate Program can be found at https://www.chem.umd.edu/graduateprogram/phdinbiochemistry (http://www.chem.umd.edu/graduateprogram/phdinbiochemistry/) and http://www.chem.umd.edu/.

Financial Assistance

Ph.D. candidates are normally supported on graduate teaching assistantships during their first year as graduate students. Teaching assistants usually instruct undergraduate laboratory and recitation classes and receive in return a tuition waiver of ten credits each semester, salary, and health care benefits. Ph.D. candidates are normally supported in subsequent years on graduate research assistantships. Financial support is not generally available to M.S. candidates.

Contact

Graduate Program Office (chem-gradoffice@umd.edu)
Dept. of Chemistry & Biochemistry
8051 Regents Drive, Room 1206A
University of Maryland
College Park, MD 20742-21111
Telephone: 301-405-1028 | 301-405-7022
Email: chem-gradoffice@umd.edu

Website: http://www.chem.umd.edu

Courses: BCHM (https://academiccatalog.umd.edu/graduate/courses/bchm/) BIOE (https://academiccatalog.umd.edu/graduate/courses/bioe/) BIPH (https://academiccatalog.umd.edu/graduate/courses/biph/) BISI (https://academiccatalog.umd.edu/graduate/courses/bisi/) CBMG (https://academiccatalog.umd.edu/graduate/courses/cbmg/) CHEM (https://academiccatalog.umd.edu/graduate/courses/chem/) CHPH (https://academiccatalog.umd.edu/graduate/courses/chph/)

Relationships: Bioengineering (BIOE) (p. 76), Biological Sciences (BISI) (p. 83), Biophysics (BIPH) (p. 86), Chemical Physics (CHPH) (p. 115), Chemistry (CHEM) (p. 117)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- GRE Subject (optional)
- CV/Resume
- Description of Research/Work Experience

Admission to graduate study in Biochemistry at the University of Maryland requires a minimum of a Bachelor of Science (B.S.), Bachelor of Arts (B.A.) or equivalent degree. Applications are normally accepted only from Ph.D.-seeking students. The area in which the undergraduate degree has been earned need not be chemistry or biochemistry, but previous coursework must normally include a minimum of 30 semester or 40 quarter hours of chemistry, including at least 1 year of general chemistry, 1 year of organic chemistry and 1 semester of biochemistry, as well as laboratory courses in organic chemistry and biochemistry. A course in physical chemistry and a laboratory course in analytical chemistry are also desirable. Typical overall grade point averages for successful applicants are 3.0 or greater (on a scale where the average grade is 2.0), and averages in science and math courses are generally higher than this. Three letters of reference indicating a potential for independent, creative scientific research are also required.

The competition for available space may limit admissions to persons with credentials above these minimum requirements.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 20, 2022
International Applicants	

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 20, 2022

RESOURCES AND LINKS:
Other Deadlines: chem.umd.edu (http://www.chem.umd.edu)
Program Website: chem.umd.edu/graduateprogram (http://www.chem.umd.edu/graduateprogram/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Biochemistry, Doctor of Philosophy (Ph.D.) (p. 73)
- Biochemistry, Master of Science (M.S.) (p. 73)

Facilities and Special Resources

Biochemistry faculty and graduate students work in well-equipped, state-of-the-art research laboratories. Instrumentation and facilities that are available for research in biochemistry include analytical and preparative ultracentrifuges, high- and ultra-high field nuclear magnetic resonance spectrometers (600, 800, 900, 950 MHz), X-ray diffractometers and SAXS, fluorimeters, circular dichroism spectrometers, fluorescence- and phosphor-imagers, calorimeter, mass spectrometers, proteomics and genomics core facilities, Sanger and next-generation DNA sequencing, microarray, quantitative PCR, electron microscopes, atomic force microscopes, confocal and TIRF fluorescence microscopes, flow cytometer, animal colony, fermentation pilot plant, high-performance computing, and a chemistry-biochemistry library.

Bioengineering, Doctor of Medicine and Master of Science (dual degree) (M.D. and M.S.)

The Doctor of Medicine / Master of Science (M.D. / M.S.) Program is a dual degree program offered with the University of Maryland School of Medicine. Students applying to the M.D./M.S. Program must first apply to and be admitted to the M.D. program at the School of Medicine, and should indicate their interest in the dual-degree program when applying to the Medical School. The program is organized in the following fashion: 2 years M.D. studies + 1 year M.S. studies + 2 years M.D. studies. The objective of this program is to broaden the educational and research scope of medical doctors in bioengineering. The program should be attractive to those interested in areas including clinical research, biomaterials, biomedical imaging, medical device innovation, medical device development, and drug development. Graduates of the combined program will receive a Doctor of Medicine degree from the University of Maryland School of Medicine as well as a Master of Science degree from the A. James Clark School of Engineering at the University of Maryland, College Park.

Bioengineering, Doctor of Medicine and Doctor of Philosophy (dual degree) (M.D. and Ph.D.)

The Doctor of Medicine / Doctor of Philosophy (M.D. / Ph.D.) Program is a dual degree program offered with the University of Maryland School of Medicine. Students applying to the M.D./ Ph.D. Program must first apply to and be admitted to the M.D. program at the School of Medicine, and should indicate their interest in the dual-degree program when applying to the Medical School. The program is organized in the following fashion: 2 years M.D. studies + 4 years Ph.D. studies + 2 years M.D. studies. The objective of this program is to develop clinicians who are deeply involved in biomedical research. Graduates of the program are typically interested in pursuing both clinical work and bioengineering research in their future careers. Graduates of the combined program will receive a Doctor of Medicine degree from the University of Maryland School of Medicine as well as a Doctor of Philosophy degree from the A. James Clark School of Engineering at the University of Maryland, College Park.

Bioengineering, Master of Science (M.S.)

Thesis only: 30 credits

Course	Title	Credits
Core Requirements		
BIOE610	Course BIOE610 Not Found (Mathematical Methods in Bioengineering)	3
BIOE612	Physiological Evaluation of Bioengineering Designs	3
Restricted Electives (chosen with advisor)		6
Unrestricted Electives (chosen with advisor)		12
BIOE799	Master's Thesis Research	6
Total Credits		**30**

The terminal M.S. degree is intended for students who are interested in expanding their knowledge of bioengineering through research, beyond what is available at the B.S. level. Therefore, the M.S. program involves both coursework and a well-defined research project culminating in a M.S. thesis. The M.S. program may be suitable for top UMD undergraduates engaged in research via an individualized, combined B.S. / M.S. program. A combined M.D. / M.S. program is also available. It should be noted, however, that due to limited resources, the department does not actively recruit students to its M.S. program. Students interested in the M.S. program should contact the Bioengineering Graduate Office prior to submitting an application.

Bioengineering, Doctor of Philosophy (Ph.D.)

The educational approach of the Ph.D. program is to combine the principles and applications embedded in engineering with the sciences of biology, medicine, and health. The motivation for many of the research projects stems from the belief that developments at the interface of biology and engineering will advance the efficacy of health care by developing new paradigms for the diagnosis of disease, and the development and delivery of new therapeutics. Our bioengineering students will gain the knowledge base and skill sets to quantitatively measure, and rationally manipulate cells, tissues, and integrated systems. Bioengineers must bring problem solving skills and design methodologies to the study of biology in an effort to translate the biological sciences into medical practice in an analogous manner to the transformation of chemistry into industrial practice that occurred in the 20th century

Advance to Candidacy: In addition to the coursework below, students must successfully complete a Research Aptitude Exam and a Ph.D. Proposal Exam.

Post-Candidacy: Students must complete 18 credits of BIOE899 and successfully defend a dissertation.

Course	Title	Credits
Required courses:		
BIOE610	Course BIOE610 Not Found (Mathematical Methods in Bioengineering)	3
BIOE612	Physiological Evaluation of Bioengineering Designs	3
BIOE608	Bioengineering Seminar Series	3
BIOE605	BIOE Graduate Studies I	1
BIOE606	BIOE Graduate Studies II	1
Restricted Electives (chosen with advisor)		6
Unrestricted Electives (chosen with advisor)		12
Dissertation Research Requirements		
BIOE899	Doctoral Dissertation Research	18
Total Credits		**47**

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Bioengineering (BIOE)

Graduate Degree Program
College: Engineering

Abstract

Welcome to the Graduate Program in the Fischell Department of Bioengineering at the A. James Clark School of Engineering, University of Maryland. Our program represents the strong intellectual interdisciplinary infrastructure and collaborative culture that links engineering, biology, and medicine at our university.

Our program provides a basic understanding of bioengineering at the molecular and cellular level, focusing on:

- Medical Devices
- Biocomputational Systems
- Optical Technologies
- Imaging
- Drug Delivery
- Therapeutics Design
- Biomolecular Engineering
- Cell and Tissue Engineering
- Biomaterials
- BioChips

With strong, funded research programs and innovative partnerships with the National Institutes of Health, Food and Drug Administration, and University of Maryland School of Medicine, the Fischell Department of Bioengineering is an exciting place for graduate study.

Financial Assistance

Graduate assistantships and fellowships are available on a competitive basis to Ph.D. students. No separate financial support application is required. Students will automatically be considered for eligible forms of support.

Contact

Please see the program's website for program description, admission requirements, and financial aid information.

Graduate Program
The Fischell Department of Bioengineering
3102A James Clark Hall
8278 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.8268
Fax: 301.405.9953
Email: bioe-grad@umd.edu

Website: http://www.bioe.umd.edu

Courses: BIOE (https://academiccatalog.umd.edu/graduate/courses/bioe/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume
- Personal History Statement (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdpersonalhistorystatementbioe.pdf) (optional): Personal History Statement to be uploaded via the Supplementary Application document upload area within the "Program Upload Requirements" section of the application.

Admission to the Graduate Program in Bioengineering requires a Bachelor's degree in a science or engineering discipline from an accredited undergraduate institution. Applicants with degrees in non-engineering disciplines, such as biology, chemistry, physics, or mathematics, are expected to have the following prerequisite courses: Calculus I, II, III; Differential Equations; and Thermodynamics. These courses would ideally have been completed by the time of application, but they may also be in progress.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 14, 2022

International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 14, 2022

RESOURCES AND LINKS:
Other Deadlines: bioe.umd.edu (http://www.bioe.umd.edu)
Program Website: bioe.umd.edu/graduate (http://www.bioe.umd.edu/graduate/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Bioengineering, Doctor of Medicine and Doctor of Philosophy (dual degree) (M.D. and Ph.D.) (p. 75)
- Bioengineering, Doctor of Medicine and Master of Science (dual degree) (M.D. and M.S.) (p. 75)
- Bioengineering, Doctor of Philosophy (Ph.D.) (p. 75)
- Bioengineering, Master of Science (M.S.) (p. 75)

Facilities and Special Resources

The Department is located in A. James Clark Hall, a 184,000 square foot building serving as a central hub for new partnerships and collaboration for organizations throughout the Maryland and Washington, D.C. region.

Approximately 7,332 sq. feet of classroom space and 11,402 sq. feet of class lab space is used to support instructional capabilities. To help create an organic flow of ideas between many disciplines, the building features flex classrooms and two stories of flexible laboratories to the campus – including wet and dry spaces as well as a vivarium.

Optical laser and imaging laboratories feature state-of-the-art technology in digital fabrication, rapid prototyping, 3D printing, optics, and bioinformatics. In the imaging suite, researchers have the ability to examine molecular resolution of pathogens – whether in the GI tract or bloodstream – that show how a nano-carrier delivers a drug to a specific tumor site. Additionally, laser devices and magnetic resonance imagers will allow a close examination of cross-sections of the body and brain.

Bioengineering, Master of Engineering (M.Eng.)

Coursework/Non-thesis only: 30 credits required
This graduate program is an approved non-thesis program. The non-thesis option has been satisfied when all coursework has been completed.

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements (Take Four Courses):		12
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658M - Applied Mathematics in Bioengineering)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658R - Regulatory Affairs in Medical Product Development)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658E - Biomedical Device Developments)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658P - Physiology for Bioengineers)	
Pre-Approved Electives (Choose 3-6 courses):		18
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658D - Application of Biomaterials)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658G - Genome Editing and Synthetic Biology)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658A - Additive Manufacturing for Bioengineering Applications)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658Y - Applications of Tissue Engineering)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658W - Biosensor Techniques, Instrumentation, and Applications)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658L - Applications in Biopharmaceutical Engineering)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658F - Applications of Bioinformatics)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658N)	
ENPM808	Advanced Topics in Engineering	
Other Electives (maximum of 3 courses). See plan.		
Total Credits		**30**

Contingent on availability of courses. Please see advisor for further details.

Bioengineering (online) (MEBI)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Students in our Bioengineering degree programs will learn to integrate priciples of engineering and biological systems to develop new technologies and devices that improve human health, fight disease, and aid persons with disabilities. Our biomedical engineering masters program is uniquley positioned to offer educational strengths in engineering, biology, and medicine.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission.

Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: BIOE (https://academiccatalog.umd.edu/graduate/courses/bioe/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus/).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:
Other Deadlines: mage.umd.edu/application-process (https://mage.umd.edu/application-process/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Bioengineering, Master of Engineering (M.Eng.) (p. 77)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Bioengineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements		
Select two of the following:		6
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658M)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658R)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658E)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658P)	
Pre-approved Electives (Select 2):		6

BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658D)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658G)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658A)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658Y)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658W)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658L)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658F)	
Total Credits		**12**

Contingent on availability of courses. Please see advisor for further details.

Bioengineering (online) (Z083)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Students in our Bioengineering degree programs will learn to integrate priciples of engineering and biological systems to develop new technologies and devices that improve human health, fight disease, and aid persons with disabilities. Our biomedical engineering masters program is uniquley positioned to offer educational strengths in engineering, biology, and medicine.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: BIOE (https://academiccatalog.umd.edu/graduate/courses/bioe/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Bioengineering, Post-Baccalaureate Certificate (P.B.C.) (p. 78)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Bioengineering, Master of Engineering (M.Eng.)

Coursework/Non-thesis only: 30 credits required
This graduate program is an approved non-thesis program. The non-thesis option has been satisfied when all coursework has been completed.

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Courses (Take Four):		12
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658M - Applied Mathematics in Bioengineering)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658R - Regulatory Affairs in Medical Product Development)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658E - Biomedical Device Developments)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658P - Physiology for Bioengineers)	
Preapproved Electives (Choose 3-6 courses):		18
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658D - Application of Biomaterials)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658G - Genome Editing and Synthetic Biology)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658A - Additive Manufacturing for Bioengineering Applications)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658Y - Applications of Tissue Engineering)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658W - Biosensor Techniques, Instrumentation, and Applications)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658L - Applications in Biopharmaceutical Engineering)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658F - Applications of Bioinformatics)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658N)	
ENPM808	Advanced Topics in Engineering	
Other technical electives (Maximum 3 courses) - See Plan for Options		
Total Credits		**30**

Contingent on availability of courses. Please see advisor for further details.

Bioengineering (PMBI)

Graduate Degree Program

College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Students in our Bioengineering degree programs will learn to integrate priciples of engineering and biological systems to develop new technologies and devices that improve human health, fight disease, and aid persons with disabilities. Our biomedical engineering masters program is uniquley positioned to offer educational strengths in engineering, biology, and medicine.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

FINANCIAL ASSISTANCE

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: BIOE (https://academiccatalog.umd.edu/graduate/courses/bioe/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:
Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Bioengineering, Master of Engineering (M.Eng.) (p. 80)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

This program is also offered 100% online. Please see Bioengineering (MEBI) for more information.

Bioengineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements		
Select two of the following:		6
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658M)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658R)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658E)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658P)	
Pre-Approved Electives (Select two):		6
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658D)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658G)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658A)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658Y)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658W)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658L)	
BIOE658	Special Topics in Bioengineering (M.Eng.) (BIOE658F)	
Total Credits		**12**

Contingent on availability of courses. Please see advisor for further details.

Bioengineering (Z054)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Students in our Bioengineering degree programs will learn to integrate priciples of engineering and biological systems to develop new technologies and devices that improve human health, fight disease, and aid persons with disabilities. Our biomedical engineering masters program is uniquley positioned to offer educational strengths in engineering, biology, and medicine.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland

College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: BIOE (https://academiccatalog.umd.edu/graduate/courses/bioe/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Bioengineering, Post-Baccalaureate Certificate (P.B.C.) (p. 81)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

This program is also offered 100% online. Please see Bioengineering (Z083) for more information.

Biological Resources Engineering, Master of Science (M.S.)

This program is not currently accepting applications.

Biological Resource Engineering, Doctor of Philosophy (Ph.D.)

This program is not currently accepting applications.

Biological Resources Engineering (ENBE)

Graduate Degree Program
College: Engineering

This program is not currently accepting applications. Please visit the Bioengineering (p. 76) program listing in this catalog.

Website: http://www.bioe.umd.edu

Relationships: Bioengineering (BIOE) (p. 76), Bioengineering (PMBI) (p. 80)

Admissions

This program is not currently accepting applications. Please visit the Bioengineering (p. 76) program listing in this catalog.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.bioe.umd.edu

Requirements

- Biological Resource Engineering, Doctor of Philosophy (Ph.D.) (p. 82)
- Biological Resources Engineering, Master of Science (M.S.) (p. 82)

Biological Sciences, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option: 30 credits

Students cannot be formally admitted into the M.S. program, but can earn the M.S. along the way to the Ph.D. Of the 30 credits required, 18 credits must be at the 600-level or above including BISI701 and BISI712. Of the

30 credits required, 16 credits must be in Biological Sciences with at least three courses in a single area of specialization.

Course	Title	Credits
Core Requirements		
BISI701	Teaching & Professional Development in Biology	1
BISI712	Responsible Conduct of Research for Biologists	1
Select 22 credits		22
Thesis or Non-Thesis Requirements		
Select one of the following:		6
Thesis:		
BISI799	Master's Thesis Research	
Non-Thesis:		
Complete a scholarly paper		
Additional coursework		
Total Credits		**30**

Biological Sciences, Doctor of Philosophy (Ph.D.)

The Ph.D. program in Biological Sciences is an interdepartmental umbrella research program that provides opportunities for students to develop scholarly, innovative, and independent work. Courses are designed to strengthen and complement the student's research. An advisory committee helps guide each student in selecting classes and other learning experiences. Students are encouraged to present their research at national and international meetings and to publish in peer reviewed journals. Seminar series featuring prominent scientists expose students to exciting topics and help students develop collaborative contacts.

Advance to Candidacy: In addition to the coursework outlined below, students must pass a qualifying exam.

Post-Candidacy: All students must complete at least 12 credits of BISI899 Doctoral Dissertation Research and successfully complete and defend an original dissertation. Students will also present that dissertation work in a seminar.

All students must complete the following requirements:

Course	Title	Credits
Core Requirements		
Select three credits of graduate seminar courses		3
Select nine credits of advanced coursework		9
Select one course in Bioethics		3
BISI701	Teaching & Professional Development in Biology	1
Specialization Requirements		
Select one of the following concentrations:		4-18
Behavior, Ecology, Evolution, and Systematics (BEES)		
Computational Biology, Bioinformatics, and Genomics (CBBG)		
Molecular and Cell Biology (MOCB)		
Physiological Systesms (PSYS)		
Dissertation Research Requirements		
BISI899	Doctoral Dissertation Research	12
Total Credits		**32-46**

Students choose from one of the following concentration options and complete the additional requirements in each:

Behavior, Ecology, Evolution, and Systematics (BEES)

Course	Title	Credits
BEES608	Seminar in Behavior, Ecology, Evolution and Systematics (BEES608A)	1
Approved Statistics course or quantitative course		3
Total Credits		**4**

Computational Biology, Bioinformatics, and Genomics (CBBG)

Course	Title	Credits
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CBMG688Y - Bioinformatics and Genomics)	2
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CBMG688P - Programming for Biology)	2
CBMG699	Special Problems in Cell Biology and Molecular Genetics (CBMG699D - Bioinformatics and Computation Biology Seminar Series)	2
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CBMG688B - Bioethics)	1
Electives		5
Total Credits		**12**

Molecular and Cell Biology (MOCB)

Course	Title	Credits
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CMBG688D - Cell Biology I: Structure and Function)	2
BCHM661	Nucleic Acids I	2
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CMGB688F - Gene Expression)	2
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CBMG6881 - Genetic Analysis)	2
CBMG688	Special Topics in Cell Biology and Molecular Genetics (CBMG688B - Bioethics)	2
Electives		8
Total Credits		**18**

Physiological Systems (PSYS)

Course	Title	Credits
Bioethics course		3
Graduate Seminar course		1-3
Three core graduate level courses		2-4
Statistics or quantitative course		3
Total Credits		**9-13**

Biological Sciences (BISI)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Biological Sciences (BISI) Graduate Program offers a wide range of training opportunities for students interested in pursuing doctoral level research in exciting, diverse areas across the biological sciences. BISI is an interdepartmental umbrella program that consists of four Areas of Concentration:

- Behavior, Ecology, Evolution, and Systematics (BEES)
- Computational Biology, Bioinformatics, and Genomics (CBBG)
- Molecular and Cell Biology (MOCB)
- Physiological Systems (PSYS)

Graduate students in BISI are associated with one of these areas, but their interests often span multiple concentrations, which allows the development of innovative research projects across traditional disciplinary boundaries. Descriptions of each Concentration Area, faculty research interests, and more detailed programmatic information are available at bisi.umd.edu (http://www.bisi.umd.edu).

Although the BISI Program is administered within the College of Computer, Mathematical, and Natural Sciences, it involves distinguished graduate faculty from multiple departments and Colleges at the University of Maryland as well as outstanding adjunct faculty from nearby research institutions. Students may have opportunities to work with participating scientists from - as examples - the National Institutes of Health; Smithsonian Institution, including the National Museum of Natural History, the National Zoo, and Molecular Systematics Laboratory; the Food and Drug Administration; and the U.S. Department of Agriculture. BISI students have an incomparable wealth of potential research options and collaborations that extend from Maryland's College Park campus throughout the Washington D.C. metropolitan area.

Financial Assistance

Students are supported through fellowships, research assistantships, and/or teaching assistantships. Each type of funding provides a stipend, tuition remission, and access to health and dental insurance and a prescription drug plan. Historically, all students have been supported throughout their graduate careers.

Fellowships are offered on a competitive basis. There are no separate financial disclosure forms to fill out as part of the graduate application process.

Teaching assistantships require students to assist a faculty member in teaching a course or lab section(s). Benefits of teaching assistantships include building communication and organizational skills as well as resume enhancement for academic, government, or private sector jobs. It is also delightfully rewarding to explain concepts to students and then witness their excitement as ideas "click" and their questions are resolved.

Contact

Students are strongly encouraged to communicate directly with faculty in the area of their interest. Additional general information may be obtained by emailing bisi@umd.edu or by calling the Biological Sciences Graduate Office at 301-405-6905.

Please visit the Biological Sciences Graduate Program website, featuring a search engine to match research interests with faculty and links to all Concentration Areas: bisi.umd.edu (http://www.bisi.umd.edu)

The Graduate School provides detailed information on International Student Admission here: http://gradschool.umd.edu/admissions/international-admissions (http://gradschool.umd.edu/admissions/international-admissions/) and additional information for international graduate students is available on the International Students and Scholars website at http://globalmaryland.umd.edu/.

Elizabeth Pepper
Program Coordinator
College of Computer, Mathematical, and Natural Sciences
Biological Sciences Graduate Program
1247 Biology-Psychology Building
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University of Maryland
College Park, MD 20740
Telephone: 301.405.6905
Email: bisi@umd.edu

Website: http://www.bisi.umd.edu

Courses: BEES (https://academiccatalog.umd.edu/graduate/courses/bees/) BIOL (https://academiccatalog.umd.edu/graduate/courses/biol/) BIOM (https://academiccatalog.umd.edu/graduate/courses/biom/) BISI (https://academiccatalog.umd.edu/graduate/courses/bisi/) BSCI (https://academiccatalog.umd.edu/graduate/courses/bsci/) CBMG (https://academiccatalog.umd.edu/graduate/courses/cbmg/) ENTM (https://academiccatalog.umd.edu/graduate/courses/entm/) MOCB (https://academiccatalog.umd.edu/graduate/courses/mocb/)

Relationships: Biochemistry (BCHM) (p. 74), Biophysics (BIPH) (p. 86), Chemistry (CHEM) (p. 117), Entomology (ENTM) (p. 183), Marine, Estuarine, and Environmental Sciences (MEES) (p. 278), Neurosciences and Cognitive Science (NACS) (p. 312)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationbisi.pdf)
- Writing Sample (one required, additional one optional)
- Publications/Presentations (optional)

All students applying to the Biological Sciences Graduate Program must have a Bachelor's degree from a recognized undergraduate institution. Applicants are expected to have a strong academic record, including coursework in advanced areas of biology as well as at least one year of calculus, general chemistry, organic chemistry, and physics. Able students with deficiencies in a particular area may be admitted and the deficiency corrected after enrollment. **Students are asked to identify a concentration area and research interests on the general application.**

To explore matches of your interests with those of BISI faculty, see the BISI website, bisi.umd.edu (http://www.bisi.umd.edu/).

For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	N/A

RESOURCES AND LINKS:
Program Website: bisi.umd.edu (http://www.bisi.umd.edu)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Biological Sciences, Doctor of Philosophy (Ph.D.) (p. 83)
- Biological Sciences, Master of Science (M.S.) (p. 82)

Facilities and Special Resources

The campus and local area provide students access to a vast array of instrumentation, equipment, facilities, and technologies to advance biological research. As examples, the college has state of the art facilities for research in all aspects of cell and molecular biology including cell and organism culturing, protein and nucleic acid analyses, peptide sequencing, oligonucleotide synthesis and sequencing, fluorescence, confocal microscopy, scanning and transmission electron microscopy, computer graphics for molecular modeling, NMR, mass-spectroscopy, and X-ray diffraction. Students have access to a laboratory for evolutionary molecular sequence analysis; gas source stable isotope mass spectrophotometer; bioacoustic lab; flume lab; GIS (graphic information systems) lab; and high-speed network access to a wide range of desktop and super-computing facilities. Greenhouses and animal care facilities are available.

We also have several state-of the-art shared instrumentation laboratories. Two center around biological imaging for both electron and light microscopy, including a field-emission scanner and an image reconstruction/deconvolution microscope. Another shared laboratory augments existing sequencing facilities on campus, enabling large-scale processing and sequencing of nucleic acids, with multiple robotic sequenators and real time PCR. Other core facilities provide instrumentation for fluorescence-activated cell sorting (FACS), NMR, mass spectrometry, and microarray technology. Equipment and analytical instruments are available in both faculty and core laboratories for the maintenance of animal and plant tissue cultures, for the production of monoclonal antibodies, for the synthesis and micro-analysis of proteins, for large-scale fermentation and cultivation of microorganisms, and for computer assisted molecular modeling. Support staffing in shared instrumentation facilities is provided by the college, and maintenance costs have been subsidized by the college, thereby providing even occasional users with appropriate training and access, and simultaneously keeping instrument use costs low. This strategy provides exceptional opportunities for research and training, and enables graduate students to perform experiments with instrumentation that is at the leading edge of biological technology.

Students have access to the Smithsonian National Museum and USDA collections of living and preserved organisms.

LIBRARY FACILITIES

The library facilities on campus, as well as their online accessibility, are outstanding. In addition, there are libraries in the local area with specialized collections. The most important are the National Agricultural Library, the Library of Congress, the National Library of Medicine, and the Smithsonian Institution Library. Thus, the University of Maryland's region contains perhaps the most comprehensive collections of books and journals in the world.

Biophysics, Master of Science (M.S.)

Thesis option: 30 credits required
Non-thesis option: 30 credits required

Course	Title	Credits
Core Requirements		
BIPH699	Research in Biophysics	4
BIPH698	Biophysics Seminar (BIPH698L)	2
Advanced course		3
Oral Presentation		
Remainder of Coursework		15
Thesis or Non-Thesis Option		
Select one of the following:		6
Thesis:		
BIPH799	Master's Thesis Research	
Non-Thesis:		
Submit a scholarly paper and pass the qualifying examination at the M.S. level		
Total Credits		**30**

Biophysics, Doctor of Philosophy (Ph.D.)

One course, Research in Biophysics, which consists of three seven week rotations through three experimental or theoretical research groups, is required of all students. A short presentation must be made to all students at the end of each rotation. Students must meet and report their progress to a three-person mentoring committee starting with the first semester.

Advance to Candidacy: In addition the coursework below, doctoral students are required to pass a qualifying exam, as well as submit and successfully present a candidacy research paper to the Program Director and the three-member committee.

Post-candidacy: Students must complete 12 credits of BIPH899 Doctoral Dissertation Research and successfully defend a dissertation.

Course	Title	Credits
Core Requirements		
BIPH698	Biophysics Seminar	2

BIPH699	Research in Biophysics	4
Dissertation Research Requirements		
BIPH899	Doctoral Dissertation Research	12
Total Credits		**18**

Biophysics (BIPH)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Biophysics Program in the Institute for Physical Science and Technology offers Ph.D. degrees in Biophysics. It is affiliated with the College of Computer, Mathematical, & Natural Sciences and the College of Engineering.

The Maryland Biophysics Program aims to train graduate students in the use of theoretical, computational, and experimental methods to gain quantitative insights into biological systems. The post genomic era is bringing tools for unprecedented characterization and control of living systems. To fully harness these tools for quantitative insights in biology, biomedicine, and bioengineering requires expertise from a number of disciplines. Thus, our program includes faculty from Chemistry, Physics, Biology, Mathematics, Materials Science, and Bioengineering. The Biophysics Program is open to students with undergraduate degrees in Chemistry, Physics, Biology, Mathematics, Computational Science, or Engineering. Because student backgrounds are diverse, we tailor the curriculum to suit the needs of the individual.

Research areas include Computational Biology and Complex Networks; Molecular Simulations; Cell Mechanics and Motility; Biological Machines and Molecular Motors; Protein and RNA Folding; Experimental and Computational Neuroscience; Membrane Biophysics; Machine Learning in Biology; Statistical Thermodynamics; Mechanobiology; Cellular dynamics in immune signaling and cancer.

The core courses that include (but are not limited to) Statistical Mechanics, Chemical Thermodynamics, Biophysical Chemistry, Membrane Biophysics and Cell Biology constitute the basis for further specialization.

Financial Assistance

TAships, RAships, Fellowships, arrangements for support from the National Institutes of Health.

Contact

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Website: http://www.marylandbiophysics.umd.edu

Courses: BCHM (https://academiccatalog.umd.edu/graduate/courses/bchm/) BIOE (https://academiccatalog.umd.edu/graduate/courses/bioe/) BIOL (https://academiccatalog.umd.edu/graduate/courses/biol/) BIPH (https://academiccatalog.umd.edu/graduate/courses/biph/) BSCI (https://academiccatalog.umd.edu/graduate/courses/bsci/) CHEM (https://academiccatalog.umd.edu/graduate/courses/chem/) ENMA (https://academiccatalog.umd.edu/graduate/courses/enma/) PHYS (https://academiccatalog.umd.edu/graduate/courses/phys/)

Relationships: Chemical Physics (CHPH) (p. 115), Chemistry (CHEM) (p. 117), Materials Science and Engineering (ENMA) (p. 281), Physics (PHYS) (p. 321), Fischell Department of Bioengineering (BIOE) (https://bioe.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose: In addition to the questions requested by the Graduate School, applicants should include their interests in the University of Maryland's Biophysics Ph.D. program
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- GRE Subject (optional)
- Miller Analogies Test (MAT) (optional)
- Graduate Management Admission Test (GMAT) (optional)
- CV/Resume
- Writing Sample(s) (optional, up to 3)
- Supplementary Applications (optional, up to 2)
- Description of Research/Work Experience

Students dedicated to a career in experimental or theoretical biophysics are sought. For more admissions information or to apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 17, 2021 (preferred, fellowship consideration)
	January 4, 2022 (final)
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 17, 2021 (preferred, fellowship consideration)
	January 4, 2022 (final)

RESOURCES AND LINKS:
Other Deadlines: marylandbiophysics.umd.edu (http://www.marylandbiophysics.umd.edu)
Program Website: marylandbiophysics.umd.edu/admissions/ (http://www.marylandbiophysics.umd.edu/admissions/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Biophysics, Doctor of Philosophy (Ph.D.) (p. 85)
- Biophysics, Master of Science (M.S.) (p. 85)

Facilities and Special Resources

Incoming students are provided with private desk space and up to date computer facilities. A Biophysics Seminar is run on the average of once a week generally given by visiting scholars. For those students electing to take the Seminar for credit (one credit is offered) must sign in each week. Three-person committee to mentor students. Symposia consisting of about six nationally and internationally known scholars are conducted once a year on various topics. Seminars and Symposia are well attended by students, postdocs, faculty, and visitors from local institutions such as NIH and Johns Hopkins.

Biostatistics, Master of Public Health (M.P.H.)

Non-thesis only: 45 credits

Course	Title	Credits
Core Requirements		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
EPIB697	Public Health Data Management	3
EPIB651	Applied Regression Analysis	3
EPIB652	Categorical Data Analysis	3
EPIB655	Longitudinal Data Analysis	3
EPIB653	Applied Survival Data Analysis	3
EPIB778	Internship in Public Health	4
EPIB786	Capstone Project in Public Health	3
Electives		9
Total Credits		**45**

Biostatistics (BIOS)

Graduate Degree Program
College: Public Health

Abstract

Biostatistics is a science that addresses theory and techniques for describing, analyzing, and interpreting health data. The discipline is primarily focused on applications to problems in the health, medical, and biological sciences. The MPH with a concentration in biostatistics is a 45-credit professional degree that prepares graduates to work in public health services as practitioners, researchers, administrators, and consultants. A full-time student may complete our program in 2 years. Part-time students may take up to 4 years to complete the program. The majority of courses are offered in the evenings. In addition to coursework, all biostatistics master's students are required to complete a 240-hour internship and a capstone project.

Our proximity to the nation's capital offers students unparalleled opportunities for research experiences in public health, including placements at the National Institutes of Health, National Center for Health Statistics, Centers for Disease Control, Food and Drug Administration, the Maryland Department of Health and Mental Hygiene, and many other national, state, and local health agencies.

CONTACT

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4200 Valley Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2551
Email: xinhe@umd.edu

Website: http://sph.umd.edu/department/epib (http://sph.umd.edu/department/epib/)

Courses: EPIB (https://academiccatalog.umd.edu/graduate/courses/epib/) SPHL (https://umd-curr.courseleaf.com/graduate/courses/sphl/)

Relationships: Epidemiology (EPDM) (p. 194) Epidemiology (EPID) (p. 195)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS Application (https://sophas.org/): Applications for this School of Public Health Program must first be submitted through the Public Health application system, www.SOPHAS.org. SPH applicants should only complete the UMD application after their SOPHAS application has been verified and you have been notified to complete the UMD application.
- Graduate Record Examination (GRE) (optional). If you decide to submit your GRE scores, please have ETS send scores to SOPHAS (code 0485) and UMD (code 5814). *The review committee will evaluate GRE scores if they are submitted. The lack of scores will not negatively impact applications. If submitted, the program considers competitive scores to be 50th percentile or higher in each of the three parts.*
- The MPH in Biostatistics program has a two-step application process. Applicants first submit the SOPHAS application (www.sophas.org (https://sophas.org/)), the centralized application service for schools and programs of public health (Step 1). Once the SOPHAS application has been verified applicants will submit their UMD Supplemental application (Step 2). Applicants will receive an email from the SPH Admissions team with instructions for how to complete the UMD Supplemental Application. Applications will not be reviewed until both the SOPHAS and UMD Supplemental applications are completed.

For detailed instructions on how to submit your application, please visit the School of Public Health Website: (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/))

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Dec. 17, 2021 (priority SOPHAS) / Jan. 14, 2022 (priority UMD Supplemental)
	May 6, 2022 (final SOPHAS) / June 3, 2022 (final UMD Supplemental)
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Dec. 17, 2021 (priority SOPHAS) / Jan. 14, 2022 (priority UMD Supplemental)
	Feb. 11, 2022 (final SOPHAS) / Mar. 11, 2022 (final UMD Supplemental)

RESOURCES AND LINKS:

Program Website: https://live-umd-sph.pantheonsite.io/academics/masters-degrees/mph-master-public-health/mph-biostatistics (https://live-umd-sph.pantheonsite.io/academics/masters-degrees/mph-master-public-health/mph-biostatistics/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Biostatistics, Master of Public Health (M.P.H.) (p. 87)

Facilities and Special Resources

Our faculty in the Department of Epidemiology and Biostatistics includes individuals with multi-faceted interests in biostatistics, epidemiology, and bioinformatics. Biostatistics faculty apply statistical techniques including survival and longitudinal analysis, computational statistics, statistical analysis of genomic and proteomic data, machine learning, neuroimaging statistics, (network) meta-analysis, missing data analysis, Bayesian hierarchical methods, and bioinformatics to analyze and interpret health data. Epidemiology faculty have research interests and expertise in the epidemiology of infectious disease and chronic disease with particular focus in the areas of HIV/STIs, cancer, health disparities, cardiovascular disease, obesity/physical activity, and sexual and reproductive health. Additional areas of specialization include social and behavioral determinants of health, aging, cultural competency, and community-based interventions.

Business Administration and Accounting, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.S.)

Non-thesis only: 66 credits required

The Robert H. Smith School of Business is a global leader in integrating business management and technology. Smith MBAs can take advantage of this strength in the joint MBA/MS degree program and leverage their managerial skills with studies that develop research and technological skills in finance, accounting, information systems, or supply chain management. Students may apply for admission to the MBA/MS degree program at the beginning of the application process or at the end of their first year in the MBA program. Students must complete all required courses for both programs and reach a total of 66 credits. Students complete 36 credits of Business courses and 30 credits of Accounting courses. Part-time MBA students complete the **BUSI** designated courses.

Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2

BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
MBA Electives approved by advisor		14
Accounting core courses		12
Accounting specialization courses		18
Total Credits		**66**

Business Administration and Accounting (BAAC)

Graduate Degree Program
R.H. Smith School of Business

abstract

Combine your MBA studies with graduate coursework in accounting to create a unique set of skills and knowledge. It's just one more way the Smith MBA can help you distinguish yourself in a competitive marketplace. Students take the MBA core courses and then complete the degree requirements for the MS in Accounting program.

CONTACT

Program information is available online at http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/). Please contact us at:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ftmba@umd.edu

Website: http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Essay
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Administration and Accounting, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.S.) (p. 88)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration, Master of Business Administration (M.B.A.)

Non-thesis only: 54 credits required

The Robert H. Smith School of Business offers an MBA program designed to provide the educational foundation for those students with the potential to exhibit the highest degree of excellence in future careers as professional managers. The MBA program requires 54 credits of coursework, which is normally four semesters for a full-time student. There is no thesis requirement. Successful students in the program are expected to demonstrate the following:

1. a thorough and integrated knowledge of the basic tools, concepts, and theories relating to professional management;
2. behavioral and analytical skills necessary to deal creatively and effectively with organizations and management problems;
3. an understanding of the economic, political, technological, and social environments in which organizations operate;

4. a sense of professional and personal integrity and social responsibility in the conduct of managerial affairs both internal and external to the organization.

Students whose cumulative grade point average falls below 3.0 will be placed on probation and will be given a specified amount of time to raise the average to a 3.0. Failure to do so will result in academic dismissal from the program. Maryland MBA graduates obtain employment in a wide spectrum of organizations at highly competitive starting salaries.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Please note: MBA students are required to complete a minimum of 22 core credits of required courses. The number of required credits could increase due to program design and some courses having variable credits between 2 and 3. Please consult with your program advisor before registering for required courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Electives approved by advisor		32
Total Credits		**54**

Business Administration (BMBA)

Graduate Degree Program
R.H. Smith School of Business

ABSTRACT

In the internationally recognized, top-ranked MBA program at Maryland Smith, future leaders develop strong analytical skills and an understanding of the way business functions like marketing, finance and operations interact.

Smith MBAs learn to leverage big data to make better decisions and explore their career options in a tight-knit community that encourages collaboration and intelligent risk-taking. With a Smith MBA, you'll be ready to lead fearlessly in any industry. The MBA program is offered in a full-time and part-time/flex format.

Financial Assistance

Financial aid is available to qualified students in the form of fellowships, graduate assistantships, and scholarships.

Contact

Program information is available online at http://www.rhsmith.umd.edu. Please contact us at:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ftmba@umd.edu (mba_info@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Business Administration, Master of Business Administration (M.B.A.) (p. 89)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

The University of Maryland Robert H. Smith School of Business is approved to operate in the District of Columbia by the Washington, DC Higher Education Licensure Commission.

Business Administration (Executive), Master of Business Administration (M.B.A.)

Non-thesis only: 54 credits required

Course	Title	Credits
Core Requirements		
EMBA616	Accounting for Senior Management	3
EMBA630	Data Models and Decisions	3
EMBA640	Financial Management	3
EMBA758	Special Topics (EMBA758D - Leadership Development)	3
EMBA758	Special Topics (EMBA758X - Leading and Managing Global Mindset)	3
EMBA758	Special Topics (EMBA758C - Global Business Environments)	3
EMBA758	Special Topics (EMBA758S - Strategic Management)	3
EMBA758	Special Topics (EMBA758F - Operations Management)	3
EMBA757	Marketing Strategy	3
EMBA621	Digital Transformation in Business	3
Electives	EMBA6xx or 7xx	24
Total Credits		**54**

Business Administration, Executive (CMBA)

Graduate Degree Program
R.H. Smith School of Business

ABSTRACT

Ranked among the best Executive MBA programs in the world, the University of Maryland's Robert H. Smith School of Business wants to prepare you to succeed and lead in a global economy. The Smith Global Leadership EMBA has been delivered in Beijing, China for more than a decade, in partnership with the University of International Business and Economics (UIBE). The Smith EMBA emphasizes personalized executive coaching to improve the leadership skills you need. Rise through the ranks, transition careers, or make a difference in the world—it all starts with a Smith EMBA.

CONTACT

Program information is available at http://www.smithchina.cn/

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ftmba@umd.edu (mba_info@rhsmith.umd.edu)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	May 3, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	May 3, 2022

RESOURCES AND LINKS:

Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: http://www.smithchina.cn/
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Administration (Executive), Master of Business Administration (M.B.A.) (p. 91)

Business Administration (Executive), Master of Business Administration (M.B.A.)

Non-thesis only: 54 credits required

The EMBA program is designed for mid-career professionals to high-level executives who desire a systemic approach to managing and leading corporate functions. Admission to the EMBA program is highly competitive and is based on significant and relevant professional and managerial work experience, prior academic performance, and personal attributes. The Robert H. Smith School of Business seeks to attract an internationally and professionally rich student population, diverse across industry and functional expertise.

Course	Title	Credits
Core Requirements		
EMBA616	Accounting for Senior Management	3
EMBA630	Data Models and Decisions	3
EMBA681	Managerial Economics and Public Policy	2
EMBA656	Leadership and Human Capital	3
EMBA757	Marketing Strategy	3
EMBA637	Corporate Finance	4
EMBA690	Strategic Management	2
EMBA683	The Global Economic Environment	2
EMBA758	Special Topics (EMBA758U - Strategic and Transformational IT)	2
EMBA694	Operations Management	2
EMBA789	Leadership Mastery	12
Electives	EMBA6xx or 7xx	16
Total Credits		**54**

Business Administration, Executive (EMBA)

Graduate Degree Program
R.H. Smith School of Business

ABSTRACT

Proven to be the best executive MBA program in the Washington, D.C. and Baltimore region, the University of Maryland's Robert H. Smith School of Business wants to prepare you to lead fearlessly. With classes beginning in January, the Smith EMBA emphasizes personalized executive coaching to hone the leadership skills you need. Rise through the ranks, transition careers, or make a difference in the world — it all starts with a Smith EMBA.

CONTACT

Program information is available online at http://www.rhsmith.umd.edu. Initial inquiries should be directed to:

Robert H Smith School of Business
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742

Telephone: 240.464.8597
Email: sbrooksh@umd.edu (execed@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	N/A	January 3, 2022
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	N/A	January 3, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: https://www.rhsmith.umd.edu/programs/executive-mba (https://www.rhsmith.umd.edu/programs/executive-mba/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Administration (Executive), Master of Business Administration (M.B.A.) (p. 92)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Finance, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.Fin.)

Non-thesis only: 66 credits required

Students complete 36 credits of Business courses and 30 credits of Finance courses. Students can specialize in either Corporate Finance, Asset Management, Risk Management, or General Finance.

The Robert H. Smith School of Business is a global leader in integrating business management and technology. Smith MBAs can take advantage of this strength in the joint MBA/MS degree program and leverage their managerial skills with studies that develop research and technological skills in finance, accounting, information systems, or supply chain management. Students may apply for admission to the MBA/MS degree program at the beginning of the application process or at the end of their first year in the MBA program. Students must complete all required courses for both programs and reach a total of 66 credits.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Finance core courses		10
MBA and Finance Electives approved by advisor		34
Total Credits		**66**

Business Administration and Finance (BAFN)

Graduate Degree Program
R.H. Smith School of Business

ABSTRACT

Combine your MBA studies with graduate coursework in finance to create a unique set of skills and knowledge. It's just one more way the Smith MBA can help you distinguish yourself in a competitive marketplace. Generally, students take the MBA core courses and then complete the degree requirements for the Master of Finance program.

CONTACT

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ftmba@umd.edu (mba_info@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Essay
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:

Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Administration and Finance, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.Fin.) (p. 93)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Information Systems, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.S.)

Non-thesis only: 66 credits required

The Robert H. Smith School of Business is a global leader in integrating business management and technology. Smith MBAs can take advantage of this strength in the joint MBA/MS degree program and leverage their managerial skills with studies that develop research and technological skills in finance, accounting, information systems, or supply chain management. Students may apply for admission to the MBA/MS degree program at the beginning of the application process or at the end of their first year in the MBA program. Students must complete all required courses for both programs and reach a total of 66 credits.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
MBA Electives approved by advisor		14
Information Systems courses		12
Information Systems specialization courses		18
Total Credits		**66**

Business Administration and Information Systems (BAIS)

Graduate Degree Program
R.H. Smith School of Business

ABSTRACT

Combine your MBA studies with graduate coursework in information systems to create a unique set of skills and knowledge. It's just one more way the Smith MBA can help you distinguish yourself in a competitive marketplace. Generally, students take the MBA core courses and then complete the degree requirements for the MS in Information Systems program.

CONTACT

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ftmba@umd.edu (mba_info@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu

Admissions
GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Administration and Information Systems, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.S.) (p. 94)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Marketing Analytics, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.S.)

Non-thesis only: 66 credits required

The Robert H. Smith School of Business is a global leader in integrating business management and technology. Smith MBAs can take advantage of this strength in the joint MBA/MS degree program and leverage their managerial skills with studies that develop research and technological skills in finance, accounting, information systems, or supply chain management. Students may apply for admission to the MBA/MS degree program at the beginning of the application process or at the end of their first year in the MBA program. Students complete **66 total credits** including 36 credits of Business courses and 30 credits of Marketing Analytics courses.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
MBA Electives approved by advisor		14
Marketing Analytics core courses		12
Marketing Analytics specialization courses		18
Total Credits		**66**

Business Administration and Marketing Analytics (BAMA)

Graduate Degree Program
R.H. Smith School of Business

ABSTRACT

Combine your MBA studies with graduate coursework in marketing analytics to create a unique set of skills and knowledge. It's just one more way the Smith MBA can help you distinguish yourself in a competitive marketplace. Generally, students take the MBA core courses and then complete the degree requirements for the MS in Marketing Analytics program.

CONTACT

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ftmba@umd.edu (mba_info@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu

Admissions

GENERAL REQUIREMENTS

- Essay
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:

Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Administration and Marketing Analytics, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.S.) (p. 95)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Nursing, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.S.)

The dual degree requires **42 credits** of Business courses. The remaining coursework is completed at the University of Maryland, Baltimore. Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Students are eligible to pursue a joint degree through the Robert H. Smith School of Business and the University of Maryland School of Nursing, located in Baltimore, Maryland. Information about the Nursing Program can be found at http://nursing.umaryland.edu/

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Electives approved by advisor		20
Total Credits		**42**

Business Administration and Nursing, Master of Business Administration and Doctor of Philosophy (dual degree) (M.B.A. and Ph.D.)

Students are eligible to pursue a joint degree through the Robert H. Smith School of Business and the University of Maryland School of Nursing, located in Baltimore, Maryland. Information about the Nursing Program can be found at http://nursing.umaryland.edu/

Business Administration and Nursing (BNRS)

Graduate Degree Program
R.H. Smith School of Business / Maryland School of Nursing

ABSTRACT

Combine your MBA studies with graduate coursework from the University of Maryland School of Nursing to create a unique set of skills and knowledge. It's just one more way the Smith MBA can help you distinguish yourself in a competitive marketplace. Candidates must apply for admission to the School of Nursing as well as to the MBA program at College Park and must be admitted to both programs. Information about the Nursing program can be found at https://www.nursing.umaryland.edu/

CONTACT

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ftmba@umd.edu (mba_info@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume
- Nursing School Application: A*pplicants should check with the* University of Maryland School of Nursing *(*https://www.nursing.umaryland.edu/*). Applicants must apply to the programs separately and be accepted by both programs.*

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)
Nursing program application requirements: https://www.nursing.umaryland.edu/

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration, Master of Business Administration (M.B.A.)

Non-thesis only: 54 credits required

Earn your MBA online in as few as under 2 years while remaining active in your current career. Engage in education online through a flexible, user-friendly learning environment recognized as one of the best in the marketplace.

Course	Title	Credits
Core Requirements		
BUSO601	Corporate Finance I	2
BUSO602	Financial Accounting	2
BUSO603	Data Analysis	2
BUSO616	Managerial Accounting	2
BUSO604	Managerial Economics and Public Policy	2
BUSO600	Leadership and Teamwork	2
BUSO612	Marketing Management	2
BUSO614	Strategic Management	2
BUSO626	The Global Economic Environment	2
BUSO620	Strategic Information Systems	2
BUSO624	Operations Management	2
Electives		32
Total Credits		**54**

Business Administration (online) (OMBA)

Graduate Degree Program
College: Business

Abstract

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

Financial Assistance

Financial support may be available to qualified online MBA students in the form of scholarship.

Contact

Smith online MBA admissions can be reached at 877-807-8741 or admissions@onlineprograms.umd.edu. Additional information about the program and admissions requirements can be found at http://onlinemba.umd.edu/.

Online MBA Admissions
Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 877.807.8741
Email: admissions@onlineprograms.umd.edu

Website: http://onlinemba.umd.edu/

Courses: EMBA (https://academiccatalog.umd.edu/graduate/courses/emba/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT)
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 12, 2022	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 12, 2022	N/A

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Administration, Master of Business Administration (M.B.A.) (p. 97)

Facilities and Special Resources

The Office of Career Services (OCS) serves as partner for students future success. Whether it's advancing confidently through a student's current organization or taking the leap to transition careers, Smith's OCS is here to help. The OCS provides students with access to:

- One-on-one career coaching: Appointments are available throughout the lunch hours and into the evening to accommodate our busy professionals' work schedules. Students have the option of meeting in person or remotely to cover a wide range of career-related topics.
- Assessment tools to identify career interests and strengths, and provide insight into development needs and potential business career options.
- Career exploration resources including a library of industry-specific videos and webinars, as well as business directories, articles and career guides with insider information.
- The UMD Alumni Network
- An automated job posting, application and interview scheduling system, and access to MBA-Exchange, which provides information on MBA-level opportunities throughout the country and globally.
- Opportunities to network with students and alumni from the broader Smith MBA community, and more!
- Note: OCS services may be subject to change.

Business Administration and Pharmacy, Master of Business Administration and Doctor of Pharmacy (dual degree) (M.B.A. and Pharm.D.)

The dual degree requires **42 credits** of Business courses. The remaining coursework is completed at the University of Maryland, Baltimore. The total combined credits will be **176 credits**, 42 from the Smith School of Business and 134 from the School of Pharmacy.

The combined program takes advantage of the Smith School of Business core courses while adding the School of Pharmacy PharmD degree requirements as an area of specialization. In this program the students would have the opportunity to take Smith School of Business or the School of Pharmacy electives at standard costs, specific to each college, to further establish an area of specialization and to satisfy the credit requirements for both the MBA and PharmD program degrees.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Electives approved by advisor		20
Total Credits		**42**

Business Administration and Pharmacy (BPHR)

Graduate Degree Program
R.H. Smith School of Business

ABSTRACT

The dual degree is designed to enhance student leadership skills in preparation for management careers in a diverse range of health care positions, and develop entrepreneurial capabilities for careers in independent and corporate pharmacy and the pharmaceutical industry.

Candidates must apply for admission to the School of Pharmacy and also to the MBA program at College Park and must be admitted to both programs. Information about the Pharmacy program can be found at https://www.pharmacy.umaryland.edu/

CONTACT

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742

Telephone: 301.405.2559
Email: ftmba@umd.edu (mba_info@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Essay
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume
- Pharm.D. Application: A*pplicants should check with the* University of Maryland School of Pharmacy *(*https://www.pharmacy.umaryland.edu/*). Applicants must apply to both programs separately and be accepted by both programs.*

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:

Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)

Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Administration and Pharmacy, Master of Business Administration and Doctor of Pharmacy (dual degree) (M.B.A. and Pharm.D.) (p. 99)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Public Policy, Master of Business Administration and Master of Public Policy (dual degree) (M.B.A. and M.P.P.)

Students complete **66 total credits** including at least 30 credits of Business courses, and at least 30 credits of Public Policy courses.

The University of Maryland Robert H. Smith School of Business and the School of Public Policy (both located in Van Munching Hall) offer a dual program of studies leading to both the MPP and MBA degrees in less time (typically 5 or 6 semesters) and at less cost than if the degrees were obtained separately.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Public Policy courses		30
Electives approved by advisor		14
Total Credits		**66**

Business Administration and Public Policy (BMPO)

Graduate Degree Program
College: Business / Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

The Robert H. Smith School of Business offers graduate programs leading to the degrees of Master of Business Administration (MBA), Executive MBA (EMBA), Online MBA, Master of Finance, Master of Science in Accounting (MS), Master of Science in Information Systems (MS), Master of Science in Marketing Analytics (MS), Master of Science in Supply Chain Management (MS), Master of Science in Business and Management (MS), Master of Quantitative Finance, Master of Science in Business Analytics (MS), and Doctor of Philosophy (PhD). The school's MBA program is accredited nationally by the Association to Advance Collegiate Schools of Business (AACSB International). Only about 607 programs in the world are accredited by the AACSB, a reflection of the quality of the faculty, students, curriculum, and career management.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business

knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition. Class sizes are small and the faculty are supportive, challenging and invested in student success.

CONTACT

The Smith School of Business has available brochures that give specific degree requirements for the MBA, EMBA, and MS Programs. Program information is available online at http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/). Initial inquiries should be directed to:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: mba_info@rhsmith.umd.edu

Website: http://www.rhsmith.umd.edu **or** http://www.publicpolicy.umd.edu

Courses: BMGT (https://academiccatalog.umd.edu/graduate/courses/bmgt/) BUAC (https://academiccatalog.umd.edu/graduate/courses/buac/) BUDT (https://academiccatalog.umd.edu/graduate/courses/budt/) BUFN (https://academiccatalog.umd.edu/graduate/courses/bufn/) BULM (https://academiccatalog.umd.edu/graduate/courses/bulm/) BUMK (https://academiccatalog.umd.edu/graduate/courses/bumk/) BUMO (https://academiccatalog.umd.edu/graduate/courses/bumo/) BUSI (https://academiccatalog.umd.edu/graduate/courses/busi/)

Admissions

GENERAL REQUIREMENTS

- Essay
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy2020.pdf)

An applicant needs to be admitted to both schools in order to enroll in this program.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)
School of Public Policy: www.publicpolicy.umd.edu/graduate/masters (http://www.publicpolicy.umd.edu/graduate/masters/)

Requirements

- Business Administration and Public Policy, Master of Business Administration and Master of Public Policy (dual degree) (M.B.A. and M.P.P.) (p. 100)

Business Administration and Real Estate Development, Master of Business Administration and Master of Real Estate Development (dual degree) (M.B.A. and M.R.E.D.)

Non-thesis only (capstone required): 74 credits

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2

BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Business electives		20
RDEV courses		32
Total Credits		**74**

Business Administration and Real Estate Development (MBRE)

Graduate Degree Program
R.H. Smith School of Business / School of Architecture, Planning and Preservation

ABSTRACT

The dual degree combines coursework from the graduate real estate and MBA programs to enable a student to complete both the Master of Business Administration and Master of Real Estate Development degrees with fewer total credits than it would take to complete the two separately and sequentially.

The Smith School of Business faculty has been recruited from the graduate programs of leading universities nationwide. They are world-renowned scholars whose teaching and research equips students with the wisdom of business scholarship rooted in the experiential lessons of the marketplace. In addition to mastering core functional business knowledge, Smith students develop sophisticated analytical skills and an "integrative" systems understanding of the way the functional aspects of organizations interact. Students learn how to leverage big data for better decision-making, and explore their career options in a tight-knit community that encourages intelligent risk-taking, not cutthroat competition.

CONTACT

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ftmba@umd.edu (mba_info@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Essay
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)
Real Estate Development: www.arch.umd.edu/rdev/degree/master-real-estate-development (http://www.arch.umd.edu/rdev/degree/master-real-estate-development/)

Requirements

- Business Administration and Real Estate Development, Master of Business Administration and Master of Real Estate Development (dual degree) (M.B.A. and M.R.E.D.) (p. 101)

Business Administration and Social Work, Master of Business Administration and Master of Social Work (dual degree) (M.B.A. and M.S.W.)

Students complete **90 total credits** including 39 credits of Business courses. The remaining coursework is completed at the University of Maryland, Baltimore. Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

This program provides a unique combination of skills for those who wish to become managers of social service agencies. Elective courses can be taken at either the School of Social Work, University of Maryland, Baltimore, or at the Robert H. Smith School of Business. This program requires 90 total credit hours for graduation and can be completed in three years. More information on the School of Social Work can be found at http://www.ssw.umaryland.edu

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Electives approved by advisor		17
Total Credits		**39**

Business Administration and Social Work (BMSW)

Graduate Degree Program
R.H. Smith School of Business / Maryland School of Social Work

ABSTRACT

In social service agencies, financial and business expertise combined with social work practice, knowledge, and experience is invaluable. The MBA and MSW degrees complement each other and provide graduates with a combination of knowledge, experience, and values necessary in business and the human services system.

Candidates must apply for admission to the School of Social Work and also to the MBA program at College Park and must be admitted to both programs. Information about the MSW program can be found at https://www.ssw.umaryland.edu/

CONTACT

MBA program information is available online at http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/). Please contact us at:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ftmba@umd.edu (mba_info@rhsmith.umd.edu)
Website: http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Essay
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT)
- Graduate Record Examination (GRE)
- CV/Resume
- M.S.W. Application: *Social Work (MSW) Requirements: applicants should check with the* University of Maryland School of Social Work *(*https://www.ssw.umaryland.edu/*). Applicants must apply to each program separately and be accepted by both programs.*

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Administration and Social Work, Master of Business Administration and Master of Social Work (dual degree) (M.B.A. and M.S.W.) (p. 102)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council. The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region

offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Administration and Supply Chain Management (dual degree) (M.B.A. and M.S.)

Non-thesis only: 66 credits required

The Robert H. Smith School of Business is a global leader in integrating business management and technology. Smith MBAs can take advantage of this strength in the joint MBA/MS degree program and leverage their managerial skills with studies that develop research and technological skills in finance, accounting, information systems, or supply chain management. Students may apply for admission to the MBA/MS degree program at the beginning of the application process or at the end of their first year in the MBA program. Students complete **66 total credits** including 36 credits of Business courses and 30 credits of Supply Chain Management courses.

Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
MBA Electives approved by advisor		14
Supply Chain Management core courses		12
Supply Chain Management specialization courses		18
Total Credits		**66**

Business Administration and Supply Chain Management (BASC)

Graduate Degree Program
R.H. Smith School of Business

ABSTRACT

Combine your MBA studies with graduate supply chain management coursework to create a unique set of skills and knowledge. It's just one more way the Smith MBA can help you distinguish yourself in a competitive marketplace. Generally, students take the MBA core courses and then complete the degree requirements for the MS in Supply Chain Management program.

contact

Program information is available online at http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/). Please contact us at:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ftmba@umd.edu (mba_info@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Essay
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:

Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Administration and Supply Chain Management (dual degree) (M.B.A. and M.S.) (p. 104)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business Analytics, Master of Science (M.S.)

Non-thesis only: 30 credits required

Course	Title	Credits
Core Requirements		
BUSI630	Data Driven Decision Making	2
BUDT733	Data Mining and Predictive Analytics	2
BUDT758	Special Topics in Decision, Operations and Information Technologies (BUDT758P - Decision Analytics)	2
BUDT758	Special Topics in Decision, Operations and Information Technologies (BUDT758Y - Database Management)	2
BUDT758	Special Topics in Decision, Operations and Information Technologies (BUDT758W - Capstone Project)	3
Electives		19
Total Credits		**30**

Business Analytics (BMAN)

Graduate Degree Program
R.H. Smith School of Business

ABSTRACT

Discover the best ways to analyze big data in today's fast-changing, data-driven world. The Master of Science in Business Analytics program gives you a deep understanding of how to analyze large amounts of data and provide innovative solutions to modern business challenges.

- Acquire a wide set of valuable skills employers are looking for when recruiting new talent to help you stand out among the competition.
- Participate in projects and experiences that mirror the type of work you'll do in the real-world.
- Take courses that will position you for a fascinating career in data analysis.

Contact

Program information is available online at http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/). Please contact us at:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: smithmasters@umd.edu

Website: http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Essay
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:

Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Analytics, Master of Science (M.S.) (p. 105)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database. The OCS also participates in regional and national career forums and job fairs.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business and Management, Master of Science (M.S.)

Non-thesis only: 30 credits

Course	Title	Credits
Core Requirements		
BUSI610	Introduction to Financial Accounting	2
BUSI630	Data Driven Decision Making	2
BUSI640	Corporate Finance	2
BUSI650	Marketing Management	2
BUSI662	Leadership and Teamwork	2
BUSI681	Managerial Economics and Public Policy	2
BUSI690	Strategic Management	2
Electives approved with advisor		16
Total Credits		**30**

Business and Management (BMSB)

Graduate Degree Program
R.H. Smith School of Business

ABSTRACT

Maryland Smith's Master of Science in Business and Management program gives you a competitive edge in the workplace through a management education. Our program provides you with foundational knowledge and a range of skills to get you started in the business world.

- Gain exposure to tools and concepts with a more concentrated focus in management than you'd get from a business minor or non-business undergraduate degree.
- Learn from top-ranked faculty and gain valuable leadership and business skills, better preparing you to step into a leadership role.
- Acquire skills in various business topics, such as accounting, finance, management and marketing.

Contact

Program information is available online at http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/). Please contact us at:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: smithmasters@umd.edu (mba_info@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Essay
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE) are optional
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business and Management, Master of Science (M.S.) (p. 106)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database. The OCS also participates in regional and national career forums and job fairs.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Business and Management, Doctor of Philosophy (Ph.D.)

Smith PhD is a full-time program designed to produce outstanding scholars in management-related disciplines. The primary goal is to place graduates in academic tenure-track faculty position at research academic institutions. Thus, a strong research philosophy pervades the entire program. The low student-to-faculty ratio fosters a high degree of interaction between faculty and students on research projects of mutual

interest, frequently culminating in journal articles. Students whose career aspirations are congruent with the program's research orientation can look forward to a learning experience that is not only demanding but also stimulating and enriching.

Students should complete course work within 2 years of the program and sit for a qualifying or comprehensive exam (or both) within those 2 years. Course requirements total 42 credits. The exam will determine whether the student should continue in the program. Students will complete 2 teaching requirements (as instructor) upon completion of course work. Additionally, students must propose their dissertation no later than May 31st of their fourth year, which designates the fifth year for the job market and completion of the dissertation.

Advance to Candidacy: In addition to the coursework outlined below, students must pass a qualifying and/or comprehensive exam, as well as successfully complete a scholarly paper.

Post-Candidacy: Students must complete at least 12 credits of BMGT899 Doctoral Dissertation Research as well as successfully defend a dissertation.

Course	Title	Credits
Core Requirements		
Major field courses		18
Research Tools courses		12
Minor field courses		12
Dissertation Research Requirements		
BMGT899	Doctoral Dissertation Research	12
Total Credits		**54**

Business and Management (BPHD)

Graduate Degree Program
R.H. Smith School of Business

Abstract

Founded in 1856, the University of Maryland is located on 1,250-acre suburban campus eight miles from Washington, D.C. and 35 miles from Baltimore. Washington, D.C. and the surrounding region offers unparalleled professional opportunities as well as a rich culture and recreational resources. This region is home to numerous federal agencies, universities, global corporations, and national and international nonprofit organizations. Robert H. Smith School of Business is one of 13 schools and colleges at the University of Maryland - one of the top-20 public research universities. This powerful combination makes Smith the ideal place to pursue a business doctoral degree.

The primary mission of Smith PhD is to produce individuals who will contribute to the discovery and dissemination of scientific knowledge through continued careers in research, publishing, and teaching at high quality research-oriented universities and research-oriented non-academic institutions throughout the world. In carrying out this mission, it is recognized that we operate in a knowledge-based economy that is being transformed by information technology.

Graduates of the program have accepted positions at various academic institutions including: Boston College, College of William and Mary, Cornell University, Columbia University, Georgetown University,Georgia Institute of Technology, Harvard, Hong Kong University of Science and Technology,Indiana University, Instituto de Empresa (Madrid), Lehigh University, McGill University, National Taiwan University, National University of Singapore, Notre Dame, Penn State University, Rensselaer Polytechnic Institute, Southern Methodist University, Syracuse University, Texas A & M University, University of Houston, University of California (Davis), University of California (Los Angeles), University of Southern California, University of Texas, University of Washington, University of Wisconsin, and Vanderbilt University.

We offer 9 fields of study, which require individual application:

- Accounting and Information Assurance
- Finance
- Information Systems
- Managerial Economics
- Marketing (Behavioral and Quantitative)
- Organizational Behavior/Human Resource Management
- Operations Management/Management Science
- Supply Chain Management
- Strategic Management & Entrepreneurship

Financial Assistance

Financial support is available to doctoral students in the form of fellowships, graduate assistantships, and scholarships. 98% of our students receive funding from Smith PhD. Students not funded by the program are typically funded by government or military scholarships, which are guaranteed for five years. Applications are considered first for quality with the assumption that funding is required from Smith PhD. Only after rendering an admissions decision will funding be considered and evaluated. Information about financial support is located on our website (https://www.rhsmith.umd.edu/programs/phd-program/admissions/financial-support/).

Contact

Smith Doctoral Programs
3330 Van Munching Hall
College Park, MD 20742
Telephone: 301.405.2214
Fax: 301.314.9611
Email: businessphd@rhsmith.umd.edu

Website: (businessphd@rhsmith.umd.edu) http://www.rhsmith.umd.edu/doctoral (http://www.rhsmith.umd.edu/doctoral/)

Courses: BMGT (p. 636)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT)
- GRE Subject (optional)

- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationbphd.pdf) (optional)
- Writing Sample(s) (optional, up to 3)
- Description of Research/Work Experience
- Essay

Prospective applicants may call (301) 405-2214 or email businessphd@rhsmith.umd.edu for information regarding the Ph.D. program

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 21, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 21, 2021

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business and Management, Doctor of Philosophy (Ph.D.) (p. 106)

Facilities and Special Resources

The Robert H. Smith School of Business offers a PhD Program Suite, where every student has access to office space and supplies. Students have access to software and research computing tools.

Business Management and Law, Master of Business Administration and Juris Doctorate (dual degree) (M.B.A. and J.D.)

Students complete **109 total credits** including 33 credits of Business courses. The remaining coursework is completed at the University of Maryland, Baltimore. Part-time MBA students complete the **BUSI** designated courses. Full-time MBA students complete the **BUSM** designated courses.

Twenty-one credits of law will be substituted for MBA elective coursework. Grade point averages in each program will be computed separately and students must maintain minimum standards in each school to continue in the program. The Graduate School will not accept transfer credit from coursework taken outside the joint program. A student must complete both programs satisfactorily in order to receive both degrees. The MBA and the JD degrees must be awarded simultaneously. A student whose enrollment is terminated in one program may elect to complete work for the degree in which he or she remains enrolled, but such completion must be upon the same conditions as required of regular (nonjoint program) degree candidates. Student programs must be approved by the law school adviser for the joint program and the Associate Dean for Masters Programs. For further discussion of admission and degree requirements, students should see the above and consult the entry in the University of Maryland School of Law catalog.

Course	Title	Credits
Core Requirements		
BUSI610/ BUSM602	Introduction to Financial Accounting	2
BUSI611/ BUSM616	Managerial Accounting	2
BUSI/BUSM621	Digital Transformation in Business	2
BUSI630/ BUSM606	Data Driven Decision Making	2
BUSI634/ BUSM624	Operations Management	2
BUSI640/ BUSM610	Corporate Finance	2
BUSI650/ BUSM612	Marketing Management	2
BUSI662/ BUSM600	Leadership and Teamwork	2
BUSI681/ BUSM604	Managerial Economics and Public Policy	2
BUSI683/ BUSM626	The Global Economic Environment	2
BUSI690/ BUSM614	Strategic Management	2
Electives approved with advisor		11
Total Credits		**33**

Business Management and Law (LMBA)

Graduate Degree Program
R.H. Smith School of Business / Maryland School of Law

ABSTRACT

The Robert H. Smith School of Business and the University of Maryland School of Law in Baltimore offer a joint program of studies leading to MBA and JD degrees. Under the terms of the joint program, a student may earn both degrees in four academic years. The accelerated program is possible because some courses can be credited toward both degrees. Candidates must apply for admission to the Law School as well as to the MBA program at College Park and must be admitted to both programs. Information about the JD program can be found at https://www.law.umaryland.edu/

contact

MBA program information is available online at http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/). Please contact us at:

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: ftmba@umd.edu (mba_info@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu (http://www.rhsmith.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- LSAT, GMAT, or GRE
- CV/Resume
- J.D. Application: *Law School (JD) Requirements: applicants should check with the* University of Maryland Law School *(*https://www.law.umaryland.edu/*). Applicants must apply to the M.B.A. and law programs separately and be accepted by both programs.*

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 15, 2022

RESOURCES AND LINKS:

Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Program Website: rhsmith.umd.edu/programs (https://www.rhsmith.umd.edu/programs/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Business Management and Law, Master of Business Administration and Juris Doctorate (dual degree) (M.B.A. and J.D.) (p. 108)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database, which matches a Smith MBA to the right industry position. The OCS also participates in regional and national career forums and job fairs, such as the National MBA Consortium, the National Black MBA Conference, the National Hispanic MBA Conference, the National Association of Women MBA's Conference, and the Career Services Council.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Chemical and Biomolecular Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements		
ENCH610	Chemical Engineering Thermodynamics	3
ENCH620	Methods of Engineering Analysis	3
ENCH630	Transport Phenomena	3
ENCH640	Advanced Chemical Reaction Kinetics	3
Electives approved by advisor		18
Total Credits		**30**

Chemical and Biomolecular Engineering (PMCH)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

From biological engineering to nanotechnology, our Chemical and Biomolecular degree programs provide students with a fundamental understanding of physical, chemical, and biological processes. Courses also empower students to apply this knowledge to products and the processes by which they are made.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENCH (p. 755)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Chemical and Biomolecular Engineering, Master of Engineering (M.Eng.) (p. 109)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Chemical and Biomolecular Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. Please see this program's specific course requirements at: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements		
ENCH620	Methods of Engineering Analysis	3
ENCH630	Transport Phenomena	3
ENCH610	Chemical Engineering Thermodynamics	3
or ENCH640	Advanced Chemical Reaction Kinetics	
Select one additional course approved by the program advisor		3
Total Credits		**12**

Chemical and Biomolecular Engineering (Z055)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

From biological engineering to nanotechnology, our Chemical and Biomolecular degree programs provide students with a fundamental understanding of physical, chemical, and biological processes. Courses also empower students to apply this knowledge to products and the processes by which they are made

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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University of Maryland
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Website: https://mage.umd.edu/

Courses: ENCH (https://academiccatalog.umd.edu/graduate/courses/ench/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:

Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Chemical and Biomolecular Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 110)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Chemical Engineering, Master of Science (M.S.)

Thesis only: 30 credits

A minimum of 30 credit hours of course work in technical areas relating directly to chemical engineering is required for the M.S. degree, 6 of which are devoted to thesis research. All students seeking graduate degrees in Chemical Engineering must enroll in ENCH610, ENCH620, ENCH630, and ENCH640 if they have not completed equivalent courses. In addition to Graduate School regulations, special degree requirements (including core course GPA requirements) are described at the Chemical Engineering Department website: www.ench.umd.edu (http://www.ench.umd.edu).

Course	Title	Credits
Core Requirements		
ENCH609	Graduate Seminar	2
ENCH610	Chemical Engineering Thermodynamics	3
ENCH620	Methods of Engineering Analysis	3
ENCH630	Transport Phenomena	3
ENCH640	Advanced Chemical Reaction Kinetics	3
ENCH799	Master's Thesis Research	6
Remainder of coursework		10
Total Credits		**30**

Chemical Engineering, Doctor of Philosophy (Ph.D.)

The Doctor of Philosophy degree is granted only upon sufficient evidence of high attainment in scholarship and the ability to engage in independent research. The Chemical Engineering Department requires minimum of 45 semester hours of course work beyond the B.S. degree. A minimum of 18 credit hours of Thesis Research is required; students in the PhD program can register only for ENCH899. All Ph.D. graduate students are required to serve as Teaching Assistants for two semesters. Other requirements, including CORE course GPA requirements are found on the Department website: www.ench.umd.edu (http://www.ench.umd.edu).

Advance to Candidacy: In addition to completing the course requirements below, students must complete a research aptitude Ph.D. qualifying examination and a research proposal including an oral presentation covering the projected Ph.D. dissertation

Post-Candidacy: Students must complete at least 12 credits of ENCH899 Doctoral Dissertation Research as well as successfully defend and submit an original dissertation.

Course	Title	Credits
Core Requirements		
Minimum of 27 credits of courses numbered 600 or above, including the following:		27

ENCH609	Graduate Seminar	
ENCH610	Chemical Engineering Thermodynamics	
ENCH620	Methods of Engineering Analysis	
ENCH630	Transport Phenomena	
ENCH640	Advanced Chemical Reaction Kinetics	
Dissertation Research Requirements		
ENCH899	Doctoral Dissertation Research	12
ENCH899	Doctoral Dissertation Research	6
or ENCH898	Pre-Candidacy Research	
Total Credits		**45**

Chemical Engineering (ENCH)

Graduate Degree Program
College: Engineering

Abstract

The Chemical and Biomolecular Engineering Department offers educational opportunities leading to a Doctor of Philosophy degree or Masters of Science degree in Chemical Engineering. Both degrees require a written thesis and an oral examination on the thesis. Our faculty research interests cover a wide array of subject matter and is well-equipped for graduate research in; aerosol science and engineering, biochemical engineering, computational modeling, fluid mechanics and mixing, fuel cell technology, metabolic engineering and systems biology, nanoparticle technology, polymer processing and characterization, polymer reaction engineering, process control, thermodynamics and transport phenomena, and systems research. The Department maintains a distributed computing network consisting of research laboratories and a PC laboratory. Major research facilities including electron microscopy, X-ray diffraction, X-ray photoelectron spectroscopy, and NMR are coordinated through a variety of laboratories.

Financial Assistance

Graduate research assistantships typically support qualified Ph.D. students. Graduate fellowships are available on a competitive basis to both entering and continuing Ph.D. students. Typically only those Ph.D. students who enter the program in the Fall semester are eligible for fellowships. We are unable to provide financial support to students in our masters degree program.

Contact

Graduate Coordinator
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Telephone: 301.405.5888
Fax: 301.405.0523
Email: enchgrad@deans.umd.edu

Website: http://www.ench.umd.edu

Courses: ENCH (https://academiccatalog.umd.edu/graduate/courses/ench/)

Admissions

The programs leading to the Master of Science and Doctor of Philosophy degrees are open to qualified students holding the Bachelor of Science degree. Admission may be granted to students with degrees in other engineering and science areas from accredited programs, and it may be necessary in some cases to require courses to establish an undergraduate Chemical Engineering background. The general regulations of the Graduate School apply in reviewing applications.

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional for Ph.D., not required for M.S.)
- CV/Resume
- Supplementary Application (optional)
- Supplementary Application Two (optional for M.S., not required for Ph.D.)
- Writing Sample(s) (optional)
- Description of Research/Work Experience (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 4, 2022	October 1, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 4, 2022	September 30, 2021

RESOURCES AND LINKS:
Other Deadlines: ench.umd.edu (http://www.ench.umd.edu)
Program Website: chbe.umd.edu (http://www.chbe.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Chemical Engineering, Doctor of Philosophy (Ph.D.) (p. 111)
- Chemical Engineering, Master of Science (M.S.) (p. 111)

Facilities and Special Resources

A number of special facilities are available for graduate study and research and are coordinated through the Polymer Reaction Engineering Laboratory, the Chemical Process Systems Laboratory, the Laboratory for Mixing Studies, the Thermophysical Properties Laboratory, the Laboratory for Biochemical Engineering and the Biochemical Reactor Scale Up Facility. These laboratories contain advanced process control computers, polymer processing equipment and polymerization reactors, polymer characterization instrumentation, fermentors, a laser Doppler anemometry facility, and an aerosol characterization facility.

Chemical and Life Sciences, Master of Chemical and Life Sciences (M.Clfs.)

Non-thesis only (scholarly paper required): 30 credits

Students with a thorough and up to date understanding of biology or chemistry, and who are admitted without condition[1], may elect to take the appropriate Admission Exam. The Admission Exams are generally based on the content of CLFS510 or CLFS520. Students who feel that they can benefit from a review may take CLFS510 or CLFS520. A passing grade (B) on either the Admission Exam or CLFS510/CLFS520 is sufficient for admission to the MCLFS program as a degree-seeking student. Students may take individual courses in the MCLFS program as Advanced Students. Up to 12 credits may be taken in this way. A maximum of six credits from other institutions may be transferred in with approval of the Director. (See: Transfer Form) The program's curriculum consists of 30 credit hours selected from the list below (not including CLFS510 or CLFS520). Included in the 30 hours are 6 credits of CLFS710 or the equivalent, and the completion of a scholarly paper. No more than six hours of CLFS608 credits may be counted towards the required 30 credits.

[1] Students with undergraduate grade point averages below 3.0, who have not previously demonstrated superior performance in graduate courses, will be required to take CLFS510 or CLFS520. (Note: as a 500-level course this cannot be used to meet the credit requirements of the MCLFS program.)

Course	Title	Credits
Core Requirements		
CLFS608	Seminar in Current Topics in Chemical and Life Science	3
CLFS710	Experimental Biology	6
CLFS725	Experimental Design	2
Remainder of coursework		19
Total Credits		**30**

Chemical and Life Sciences (CLFS)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Master of Chemical and Life Sciences is an online content-based masters program for high school science teachers that provides in-depth knowledge of current research areas in the biological, biochemical and biomedical sciences. The courses cover subject matter as diverse as genetic engineering and gene therapy to chemistry, ecology and the concepts of biocomplexity. University faculty who are experts in the field will lead discussion sessions on topics of current interest with significant social impact. Topic examples include the positive and negative aspects of genetically engineered foods and their safety, the development of new energy sources and the ethical and moral issues involved in cloning and the handling of genetic information. The program also provides a set of laboratory experiences that facilitates the presentation of many of these concepts in the classroom. Aside from the laboratory experiences, all courses will be offered exclusively through distance education as online courses. Our infrastructure provides a web-based asynchronous program. Teachers who desire to update and advance their knowledge or who must complete an advanced degree or graduate courses, will find that this program meets their needs. In addition to our general program we offer focused Areas of Concentration in Biology and in Chemistry. During the course of studies towards a degree students may earn Credentials by taking a series of focused courses.

Contact

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Website: http://mclfs.umd.edu/

Courses: CLFS (https://academiccatalog.umd.edu/graduate/courses/clfs/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (none)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationclfs.pdf)
- Science Undergraduate Degree: The undergraduate degree must be in biological science, chemistry, biochemistry or science education.
- Teaching Experience: The applicant must demonstrate one year minimum teaching experience.

Admission Information for the Master of Chemical and Life Sciences can be found here: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/master-chemical-life-sciences-mclfs/apply (https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/master-chemical-life-sciences-mclfs/apply/). UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS). Additional requirements can be found here: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/master-chemical-life-sciences-mclfs/apply#International (https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/master-chemical-life-sciences-mclfs/apply/#International)

In addition to a suitable undergraduate education and experience admission to the degree program requires the successful completion

of either CLFS510 or CLFS520, gateway review classes; or a passing grade of B or better on either of the admissions exams based on CLFS510 and CLFS520. Suitable GRE scores will also be accepted to satisfy admission requirements (GRE scores are not required!). Upon application and the submission of documentation all applicants will be granted Provisional Admission to the program while they satisfy other admission requirements.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	August 19, 2022	February 18, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	August 19, 2022	February 18, 2022

RESOURCES AND LINKS:
Program Website: mclfs.umd.edu (http://mclfs.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Chemical and Life Sciences, Master of Chemical and Life Sciences (M.Clfs.) (p. 113)

Chemical Physics, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option: 30 credits

Course	Title	Credits
Thesis or Non-Thesis Requirements		
Select one of the following:		30
Thesis:		
Select 24 credits of coursework including an advanced laboratory course		
CHPH799	Master's Thesis Research	
Non-Thesis:		
Complete 30 credits of coursework. Students must pass a written qualifying exam at the M.S. level and submit a scholarly paper.		
Total Credits		**30**

Admission to the program is limited to Ph.D. students. Students can earn a thesis or a non-thesis M.S. degree while working towards the Ph.D. degree. In order to earn a non-thesis M.S. degree in Chemical Physics, students must pass the written Qualifying Examination at the M.S. level, maintain a B average, scholarly paper, 30 graduate credits of which 24 must be course credits including:

1. Advanced laboratory course
2. Two credits of seminar, can be included in the non-course credits
3. Advanced course at the 600 level or above
4. Two laboratory rotations

The Examining Committee consists of at least two faculty members, who will read the scholarly paper and attend the oral presentation. The paper should provide an informative review of the research topic selected by the candidate in consultation with his/her academic and research advisors. The bibliography is a particularly important part of the paper and should include the most significant references to the topic. The length of the paper is expected to be approximately 20 double space pages (12-point font) with 1-inch margins. The presentation is to last approximately one hour and can be part of regularly scheduled seminar series such as the Informal Statistical Mechanics Seminar or the Nonlinear Dynamics Seminar. Two faculty must be present and there should be sufficient time for questions and discussion.

For the thesis M.S. degree, students must complete a written masters thesis, maintain a B average, a scholarly paper and complete 30 graduate credits including:

1. Six credits of CHPH799
2. 24 course credits
3. Two credits of seminar, can be included in the non-course credits
4. Advanced laboratory course
5. Advanced course at the 600 level or above
6. Two laboratory rotations

The Thesis Examining Committee is to consist of at least three faculty members including the research advisor. The Examination Committee will review the M.S. thesis, attend the oral presentation and participate in the defense of the thesis. The thesis is to consist of an introduction to the field of research with which the student is engaged, a clear statement of the problem under study, the objectives of the research, the approach taken, original results, interpretation, discussion, and conclusions. A concise review of the literature, and a bibliography of the most important literature should also be included. The M.S. thesis has no set length, but is typically 30 to 40 pages. The format of the thesis (font, margins, etc.) must follow the University of Maryland Thesis and Dissertation Style Guide.

Chemical Physics, Doctor of Philosophy (Ph.D.)

Course	Title	Credits
Core Requirements		
24 credits of coursework including:		
PHYS612	Quantum and Statistical Physics I (Quantum and Statistical Physics I)	4
PHYS613	Course PHYS613 Not Found (Quantum and Statistical Physics II)	4
CHEM684	Chemical Thermodynamics	3
CHEM687	Statistical Mechanics and Chemistry	3
CHPH718I	Chemical Physics Rotation	2
Advanced laboratory course at 600 level or above		3
Advanced course at 600 level or above [1]		3
Seminar courses		2

Dissertation Research Requirements		
CHPH899	Doctoral Dissertation Research	12
Total Credits		**36**

[1] This requirement cannot be met with a Core course.

Advance to Candidacy: In addition to the course requirements, students must submit a scholarly paper and make an oral presentation. The paper and presentation are evaluated by a candidacy committee consisting of at least three faculty members, generally including the advisor and a member of the advisory committee. In addition, students must pass a Qualifying Examination, normally taken the summer before the second year, after the four core courses have been taken. Students earning a B+ or better in Core courses are eligible to waive taking the course-specific qualifier questions.

Students with a well-developed thesis topic and research results are expected to include these results together with further research plans in their scholarly paper and oral presentation. Students less far along with research will present background material and summaries of the research areas in which they will be working. A concise review of the literature is expected, along with a bibliography of the most important literature. The length of the paper is expected to be between approximately 20 double space pages (12-point font) with 1-inch margins. The paper is to be submitted to the candidacy committee at least two weeks before the date of the oral presentation. The presentation is to last approximately 50 minutes and can be part of regularly scheduled seminar series such as the Informal Statistical Mechanics Seminar or the Nonlinear Dynamics Seminar. Two members of the candidacy committee must be present and there should be sufficient time for questions and discussion.

Ph.D. Candidates: Within 12 to 18 months after beginning Ph.D. research, the candidate is to select a Ph.D. Thesis Examination Committee. To complete the PhD, candidates must earn at least 12 credits of CHPH899 (Ph.D. dissertation research, only available after advancement to Ph.D. candidacy) and prepare a written Ph.D. dissertation, the format of which (font, margins, etc.) must follow the University of Maryland Thesis and Dissertation Style Guide.

Doctoral students must maintain a minimum GPA of 3.0. Students must complete 24 credits of coursework including:

1. Two credits of seminar
2. Advanced laboratory course
3. Advanced course outside of the student's main field of study at the 600 level or above

Chemical Physics (CHPH)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Chemical Physics Program is a course of study and research leading to a Doctor of Philosophy degree for students who wish to enter professional careers requiring an in-depth knowledge of both physics and chemistry. Students can choose research topics across many disciplines including biophysics, chemistry, physics, chemical engineering, electrical engineering, materials and nuclear engineering, mechanical engineering, meteorology and quantum science, information and technology.

The Chemical Physics Program is designed for students with undergraduate degrees in Physics, Chemistry, Mathematics, or Engineering who are sufficiently well prepared in mathematics and the physical sciences to undertake graduate training in physics and physical chemistry. Formal course offerings in quantum mechanics, quantum chemistry, spectroscopy, thermodynamics, electricity and magnetism, statistical mechanics and biophysics prepare a student to explore the broad range of research topics at the University of Maryland.

The Chemical Physics Program is hosted and administered by the Institute for Physical Science and Technology, in collaboration with seven academic departments: Chemistry and Biochemistry, Physics, Electrical and Computer Engineering, Chemical Engineering, Materials and Nuclear Engineering, Mechanical Engineering, and Meteorology. The Chemical Physics Committee oversees the program and is made up of representatives (Chemical Physics faculty) from the sponsoring units with the Program Director as chair. Formal arrangements with the National Institute of Standards and Technology (NIST) and the National Institute of Health (NIH) allow students to perform research off campus under the supervision of a government scientist associated with the program and a Chemical Physics faculty member.

Research areas include Atmospheric and Space Sciences; Nano, Meso, and Micro-Scale Science and Technologies; Experimental and Theoretical Atomic, Molecular and Optical (AMO) Sciences and Ultrafast Optics; Experimental and Theoretical Condensed Matter and Material Sciences; Neutron Scattering and NMR; Experimental and Theoretical Nonlinear Dynamics and Chaos; Experimental and Theoretical Quantum Science, Information and Technology -- Joint Quantum Institute (JQI), the Joint Center for Quantum Information and Computer Science (QuICS) and the Quantum Technology Center (QTC); Experimental and Theoretical Statistical Mechanics, Phase Transitions and Thermodynamics.

Financial Assistance

Students are admitted with Teaching Assistantships or Research Assistantships. University and Chemical Physics Fellowships are also available.

Contact

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Website: http://www.chemicalphysics.umd.edu

Courses: CHPH (https://academiccatalog.umd.edu/graduate/courses/chph/) CHEM (https://academiccatalog.umd.edu/graduate/courses/chem/) PHYS (https://academiccatalog.umd.edu/graduate/courses/

phys/) ENME ENMA (https://academiccatalog.umd.edu/graduate/courses/enma/) ENEE ENCH MATH

Admissions

The program is for students with undergraduate degrees in chemistry, physics, mathematics, or engineering. For those students with degrees in other disciplines, knowledge of calculus, differential equations, and vector algebra, as well as introductory mechanics, electricity and magnetism, and quantum mechanics is ordinarily expected.

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- GRE Subject (optional)
- Miller Analogies Test (MAT) (optional)
- Graduate Management Admission Test (GMAT) (optional)
- CV/Resume
- Writing Sample (optional, up to 3)
- Supplementary Applications (optional, up to 2)
- Description of Research/Work Experience

For more information on admission, please visit the Graduate School website: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

The application deadline is Tuesday, Jan 4, 2022 with Friday, December 17, 2021 being the preferred application deadline to be considered for fellowship nominations.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	December 17, 2021 (preferred)	N/A
	January 4, 2022 (final)	
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 17, 2021 (preferred)	N/A
	January 4, 2022 (final)	

RESOURCES AND LINKS:

Program Website: chemicalphysics.umd.edu (http://www.chemicalphysics.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Chemical Physics, Doctor of Philosophy (Ph.D.) (p. 114)
- Chemical Physics, Master of Science (M.S.) (p. 114)

Facilities and Special Resources

Incoming students are provided with private desk space and up to date computer facilities. There is a wide array of advanced equipment associated with the various research groups in the Program including scanning probe microscopes, high-resolution spectrographs, ultra-short high-power lasers, multi-coincidence electron scattering spectrometers, and a fully equipped light-scattering laboratory.

Chemistry, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

Thesis Option

At least 12 of the 24 credits of coursework must be in Chemistry or Biochemistry numbered 600 or higher. In addition, students are required to complete six credits of CHEM799. The thesis option requires a seminar presentation and an oral defense of the thesis.

Non-Thesis Option

At least 18 of the 24 credits of coursework must be in Chemistry or Biochemistry, of which at least 14 credits must be at or above the 600 level. In addition, students are required to complete six credits of CHEM699 and submit a scholarly paper. The scholarly paper is reviewed by a committee of 3 faculty members. Copies of specific regulations are available from the Department of Chemistry and Biochemistry or on the internet at: www.chem.umd.edu.

Course	Title	Credits
Required courses:		24
CHEM611	Professional Skills for New Graduate Students	
CHEM612	Scientific Presentations	
Thesis or Non-Thesis Requirements		**6**
Thesis		
CHEM799	Master's Thesis Research	
Non-Thesis		
CHEM699	Special Problems in Chemistry	
Scholarly Paper		
Total Credits		**30**

Chemistry, Doctor of Philosophy (Ph.D.)

Advance to Candidacy: In addition to the coursework below, students must successfully pass an oral exam.

Post-candidacy: Complete at least 12 credits of 899 Doctoral Dissertation Research and successfully defend your dissertation.

At least 12 of the 21 credits of coursework must be in Chemistry or Biochemistry courses numbered 600 or higher.

Course	Title	Credits
Coursework requirements include:		21
CHEM611	Professional Skills for New Graduate Students	

CHEM612	Scientific Presentations	
CHEM889	Seminar [1]	
Dissertation Research Requirements		
CHEM899	Doctoral Dissertation Research	12
Total Credits		**33**

[1] One credit of CHEM889 can be counted towards the 21 credit requirement but only if that one credit is earned during the semester that the student presents a formal seminar.

Chemistry (CHEM)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Department of Chemistry and Biochemistry offers graduate study leading to the Ph.D. degree in Chemistry. Our Ph.D. program in Chemistry has a strong core in the traditional fields of chemistry, including analytical chemistry, chemical physics (in cooperation with the Institute of Physical Sciences & Technology), environmental chemistry, inorganic chemistry, nuclear chemistry, organic chemistry and physical chemistry. In addition to these traditional areas we also have interdisciplinary programs in contemporary areas such as nanoscience, chemical biology, energy sciences, materials chemistry, theoretical chemistry, and supramolecular chemistry.

Financial Assistance

Ph.D. candidates are normally supported on graduate teaching assistantships during their first year in graduate school as long as they are in good standing. Teaching assistants usually instruct undergraduate laboratory and recitation classes and receive in return a tuition waiver of ten credits each semester, a salary and health care benefits. In subsequent years, Ph.D. candidates are typically supported on graduate research assistantships or fellowships. Financial assistance is not typically available to M.S. candidates.

Contact

Graduate Program Office (chem-gradoffice@umd.edu)
Dept. of Chemistry & Biochemistry
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College Park, MD 20742-21111
Telephone: 301-405-1028 | 301-405-7022
Email: chem-gradoffice@umd.edu

Website: http://www.chem.umd.edu

Courses: BCHM (https://academiccatalog.umd.edu/graduate/courses/bchm/) CHEM (https://academiccatalog.umd.edu/graduate/courses/chem/)

Relationships: Biochemistry (BCHM) (p. 74), Chemical Physics (CHPH) (p. 115)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- GRE Subject (optional/highly recommended)
- CV/Resume
- Description of Research/Work Experience

Admission to graduate study at the University of Maryland requires a minimum of a Bachelor of Science (B.S.), Bachelor of Arts (B.A.) or equivalent degree. Previous coursework must normally include a minimum of 30 semester or 40 quarter hours of chemistry, with at least 1 year of physical chemistry, 1 year of organic chemistry and 1 semester of inorganic chemistry, as well as laboratory courses in organic chemistry and physical chemistry. A laboratory course in analytical chemistry is also preferred.

The chemistry subject GRE score is not required but it can be helpful for a complete evaluation. Applicants from non-English speaking countries must also present the results of the Test of English as a Foreign Language (TOEFL) and the Test of Spoken English (TSE).

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 20, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 20, 2022

RESOURCES AND LINKS:
Other Deadlines: chem.umd.edu (http://www.chem.umd.edu)
Program Website: chem.umd.edu/graduateprogram (http://www.chem.umd.edu/graduateprogram/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Chemistry, Doctor of Philosophy (Ph.D.) (p. 116)
- Chemistry, Master of Science (M.S.) (p. 116)

Facilities and Special Resources

The Department has state-of-the-art research facilities to support research in the fields listed above. Facilities include "clean" rooms for environmental sample analysis, X-ray crystallographic instrumentation, numerous mass spectrometers, numerous NMR spectrometers including 400, 500, 600 and 800 MHz Fourier-transform NMR spectrometers; an XPS spectrometer, Atomic Force Microscopes, ultracentrifuges, analytical optical spectrometers, and a state-of-the-art computer graphics facility.

Departmental research is supported by a departmental server and many individual faculty workstations. The Department has access to electronics shop and campus machine shops. The Chemistry Library

has an extensive collection in chemistry, biochemistry, and other fields. Electronic access to journals and literature search databases is available. A Macintosh workstation facility (25 units) is available in the Department for student/faculty use.

Civil and Environmental Engineering, Master of Science (M.S.)

Students are required to complete 30 credits within one of the seven specializations. Students complete a set of core courses as well as electives. The M.S. degree program offers a thesis option and very rarely a non-thesis option. Applicants who do not wish to complete a thesis are encouraged to consider the Professional Master of Engineering (ENPM) degree instead: https://academiccatalog.umd.edu/graduate/programs/civil-environmental-engineering-pmce/

THESIS OPTION:

- At least 24 credits of coursework are required beyond the B.S. degree, including a minimum of 18 credits at the 600 level or above.
- In addition, six credits of ENCE799 are required.

NON-THESIS OPTION:

- At least 30 credits of coursework are required beyond the B.S. degree, including a minimum of 24 credits at the 600 level or above.
- In addition, students are required to complete a scholarly paper

Course	Title	Credits
Specialization Requirements (select one)		**30**
1. Environmental		
ENCE650	Process Dynamics in Environmental Systems	
ENCE651	Chemistry of Natural Waters	
ENCE652	Microbiological Principles of Environmental Engineering	
2. Civil Systems		
ENSE621	Systems Engineering Concepts and Processes: A Model-Based Approach	
or ENSE622	System Trade-off Analysis, Modeling, and Simulation	
ENCE603	Data Analytics for Project Managers	
or ENCE677	OR Models for Transportation Systems Analysis	
ENCE688	Advanced Topics in Civil Engineering (ENCE688A Sensing and Systems Control)	
3. Geotechnical		
All courses approved by advisor		
4. Project Management		
ENCE661	Project Cost Accounting and Finance	
ENCE662	Introduction to Project Management	
ENCE664	Legal Aspects of Engineering Design and Construction	
ENCE665	Management of Project Teams	
ENCE627	Project Risk Management	
5. Structures		
All courses approved by advisor		
6. Transportation		
All courses approved by advisor		
7. Water Resources		
ENCE431	Hydrologic Engineering	
ENCE630	Environmental and Water Resource Systems I	
Total Credits		**30**

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Civil and Environmental Engineering, Doctor of Philosophy (Ph.D.)

The requirements for the Ph.D. degree are also the same as those of the Graduate School. The student will work closely with an adviser to develop an approved program of study suited to his or her individual needs. Before admission to candidacy, the student must pass a qualifying examination, which is normally taken after the coursework is at least 75 percent completed. There is no language requirement for the Ph.D.

Advance to Candidacy: Doctoral students are required to complete 36 credits beyond the Bachelor's degree, which would include the credits earned in the completion of a Master's degree. A qualifying examination is required in order to advance to candidacy.

Post-Candidacy: A doctoral student who passes the qualifying exam is admitted to candidacy will automatically be registered for 6 credits of ENCE899. A minimum of 12 credits must be taken in ENCE899.

Course	Title	Credits
Specialization Requirements (select one)		**30**
1. Environmental		
ENCE650	Process Dynamics in Environmental Systems	
ENCE651	Chemistry of Natural Waters	
ENCE652	Microbiological Principles of Environmental Engineering	
2. Civil Systems		
ENSE621	Systems Engineering Concepts and Processes: A Model-Based Approach	
or ENSE622	System Trade-off Analysis, Modeling, and Simulation	
ENCE603	Data Analytics for Project Managers	
or ENCE677	OR Models for Transportation Systems Analysis	
ENCE688	Advanced Topics in Civil Engineering (ENCE688A Sensing and Systems Control)	
3. Geotechnical		
All courses approved by advisor		
4. Project Management		
ENCE661	Project Cost Accounting and Finance	
ENCE662	Introduction to Project Management	
ENCE664	Legal Aspects of Engineering Design and Construction	
ENCE665	Management of Project Teams	
ENCE627	Project Risk Management	
5. Structures		
All courses approved by advisor		
6. Transportation		
All courses approved by advisor		
7. Water Resources		
ENCE431	Hydrologic Engineering	
ENCE630	Environmental and Water Resource Systems I	
Dissertation Research Requirements		**12**

ENCE899	Doctoral Dissertation Research
Total Credits	**42**

Civil and Environmental Engineering (ENCE)

Graduate Degree Program
College: Engineering

Abstract

The Department of Civil and Environmental Engineering offers graduate courses leading to the Master of Science and Doctor of Philosophy degrees. All programs are planned on an individual basis by the student and an advisor taking into consideration the student's background and special interests. Areas of concentration at both the master's and doctoral levels include: Civil Systems, Disaster Resilience, Environmental, Geotechnical, Project Management, Transportation, Structures and Water Resources.

Financial Assistance

Research assistantships may be available from individual faculty members, depending on available resources. Only a limited number of teaching assistantships are available. Part-time work as grading assistants may be available as well. For best consideration for funding, apply by the preferred deadlines: September 1 for Spring admission, and January 15 for Fall admission.

Contact

Department of Civil and Environmental Engineering
1173 Glenn L. Martin Hall
4298 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4195
Fax: 301.405.2585
Email: ceegradstudies@umd.edu

Website: cee.umd.edu **(**https://academiccatalog.umd.edu/graduate/programs/civil-environmental-engineering-ence/cee.umd.edu**)**

Courses: ENCE (p. 749)

Admissions

All applicants must hold a Bachelor's degree, typically in engineering, physical sciences, mathematics, or other quantitative fields, from an accredited institution. Applicants with undergraduate degrees in other disciplines are evaluated on a case by case basis and may be accepted with the stipulation that deficiencies in prerequisite undergraduate coursework be corrected before enrolling in graduate courses. In addition to the requirements set forth by the Graduate School, applicants must have a minimum GPA of 3.0 to apply to the Master's Program, and a minimum GPA of 3.5 to apply to the Doctoral Program. Applicants with lower GPAs may be considered and accepted in a provisional basis if other indicators of ability are exceptional (letters of recommendation, GRE scores, prior experience, etc.).

We strongly encourage applicants to the M.S. or Ph.D. in Civil and Environmental Engineering to identify one or two faculty members (on the Educational Intent section of the application) with whom you might be interested in working should you be admitted to the program. Identifying your faculty interests will help us better-evaluate your application. Preferred deadline (best consideration for funding): September 1 for Spring admission, and January 15 for Fall admission.

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Graduate Record Examination (GRE) ****OPTIONAL for Spring 2022 and Fall 2022 applications****

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	May 1, 2022	October 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	February 1, 2022	September 15, 2021

RESOURCES AND LINKS:

Other Deadlines: cee.umd.edu/graduate/prospective-students/admissions (https://cee.umd.edu/graduate/prospective-students/admissions/)
Program Website: cee.umd.edu/graduate/prospective-students/admissions (https://academiccatalog.umd.edu/graduate/programs/civil-environmental-engineering-ence/cee.umd.edu/graduate/prospective-students/admissions/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Civil and Environmental Engineering, Doctor of Philosophy (Ph.D.) (p. 118)
- Civil and Environmental Engineering, Master of Science (M.S.) (p. 118)

Facilities and Special Resources

Departmental research facilities include laboratories in the following areas: transportation, systems analysis, environmental engineering, hydraulics, remote sensing, structures, and soil mechanics. Graduate students have convenient access to a spectrum of computer facilities, including networked personal computers and workstations, specialized computer-aided design, graphics, and visualization laboratories, campus mainframe computers, and remote supercomputer facilities.

The Washington and Baltimore metropolitan areas are easily accessible for data, field studies, library access, contacts with national

organizations, and attendance at national meetings. The location of the University of Maryland offers a unique opportunity to obtain an advanced degree in civil engineering.

Civil and Environmental Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

All students must complete 30 credits of coursework within one of the following specializations. Courses listed under each option are pre-approved. Any other course a student wishes to take must be approved by an advisor.

Geotechnical and pavements

Course	Title	Credits
Students can select from the following courses. All other courses must be approved by an advisor.		30
ENCE640	Advanced Soil Mechanics	
ENCE641	Advanced Foundations Systems	
ENCE644	Advanced Pavement and Civil Engineering Materials	
ENCE645	Geotechnics of Waste Disposal	
ENCE647	Slope Stability and Seepage	
ENCE741	Earth Retaining Structures	
ENCE743	Soil Dynamics and Earthquake Engineering	
ENCE744	QA/QC and Specification for Highway Materials	
ENPM808	Advanced Topics in Engineering (ENPM808Q Forensic Engineering)	

Structures

Course	Title	Credits
Students can select from the following courses. All other courses must be approved by an advisor.		30
ENCE610	Fundamentals of Structural Analysis	
ENCE611	Finite Element Methods	
ENCE613	Structural Dynamics	
ENCE710	Steel Structures I	
ENCE713	Concrete Structures I	
ENCE715	Earthquake Engineering	
ENCE717	Bridge Structures	
ENCE718	Advanced Structural Systems	
ENPM808	Advanced Topics in Engineering (ENPM808Q Forensic Engineering)	

transportation

Course	Title	Credits
Students can select from the following courses. All other courses must be approved by an advisor.		30
ENCE670	Highway Traffic Characteristics and Measurements	
ENCE672	Regional Transportation Planning	
ENCE673	Urban Transportation	
ENCE674	Urban Transit Planning and Rail Transportation Engineering	
ENCE675	Airport Planning and Design	
ENCE676	Highway Traffic Flow Theory	
ENCE677	OR Models for Transportation Systems Analysis	
ENCE681	Freight Transportation Analysis	
ENPM808	Advanced Topics in Engineering (ENPM808Q Forensic Engineering)	

Environmental and water resources

Course	Title	Credits
Students can select from the following courses. All other courses must be approved by an advisor.		30
ENCE630	Environmental and Water Resource Systems I	
ENCE631	Hydrologic Analysis and Nonpoint Pollution Models	
ENCE635	Geographic Information Systems for Watershed Analysis	
ENCE652	Microbiological Principles of Environmental Engineering	
ENCE650	Process Dynamics in Environmental Systems	
ENCE651	Chemistry of Natural Waters	
ENCE655	Environmental Behavior of Organic Pollutants	
ENCE730	Environmental and Water Resource Systems II	
ENPM808	Advanced Topics in Engineering (ENPM808Q Forensic Engineering)	
ENPM809	Special Topics in Engineering (ENPM809O River Engineering)	

Civil and Environmental Engineering (PMCE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our degree programs in civil and environmental engineering provide advanced expertise in structures, pavements, environmental engineering, and water resources.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission.

Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
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University of Maryland
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Telephone: 301.405.7712
Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENCE (p. 749)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Civil and Environmental Engineering, Master of Engineering (M.Eng.) (p. 120)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Civil and Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Students must complete 12 credits in one of the certificate track options.

Environmental and Water Resources

Course	Title	Credits
ENCE630	Environmental and Water Resource Systems I	3
Select three additional approved courses		9
ENCE688	Advanced Topics in Civil Engineering (ENCE688C)	
ENCE688	Advanced Topics in Civil Engineering (ENCE688O)	
ENCE688	Advanced Topics in Civil Engineering (ENCE688B)	
ENCE688	Advanced Topics in Civil Engineering (ENCE688T)	
ENCE688	Advanced Topics in Civil Engineering (ENCE688Y)	
Total Credits		**12**

Geotechnical

Course	Title	Credits
ENCE640	Advanced Soil Mechanics	3
ENCE741	Earth Retaining Structures	3
Select two additional approved courses		6
ENCE641	Advanced Foundations Systems	
ENCE688	Advanced Topics in Civil Engineering (ENCE688P)	
ENCE688	Advanced Topics in Civil Engineering (ENCE688T)	
ENCE743	Soil Dynamics and Earthquake Engineering	
Total Credits		**12**

Structural

Course	Title	Credits
ENCE611	Finite Element Methods	3
ENCE710	Steel Structures I	3
ENCE713	Concrete Structures I	3
Select one additional approved course		3
ENCE610	Fundamentals of Structural Analysis	

ENCE613	Structural Dynamics	
Total Credits		**12**

Transportation

Course	Title	Credits
Select four of the following:		12
ENCE674	Urban Transit Planning and Rail Transportation Engineering	
ENCE675	Airport Planning and Design	
ENCE677	OR Models for Transportation Systems Analysis	
ENCE681	Freight Transportation Analysis	
ENCE688	Advanced Topics in Civil Engineering	
Total Credits		**12**

Civil and Environmental Engineering (Z056)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our degree programs in civil and environmental engineering provide advanced expertise in structures, pavements, environmental engineering, and water resources.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENCE (p. 749)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement.
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Civil and Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 121)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Classics, Master of Arts (M.A.)

Students choose either the Latin or Latin and Greek track. All students must pass a proficiency exam, submit a Scholarly Article Analysis, commentary, and present at the Classics department research conference.

Latin track: 30 credits required

Course	Title	Credits
Core Requirements		
LATN472	Historical Development of the Latin Language	3
or LATN672	Historical Development of the Latin Language	
Two courses may be in CLAS, HIST, or an allied field		6
Two of the remaining courses may be in LATN4xx, the others must be LATN6xx		21
Total Credits		**30**

Latin and Greek track: 33 credits required

Course	Title	Credits
Core Requirements		
LATN472	Historical Development of the Latin Language	3
or LATN672	Historical Development of the Latin Language	
GREK472	History and Development of the Greek Language	3
or GREK672	History and Development of the Greek Language	
One course may be in CLAS, HIST, or an allied field		3
One of the remaining courses may be in LATN4xx; two of the remaining courses may be in GREK4xx; the others must be LATN6xx or GREK6xx		24
Total Credits		**33**

Classics (CLAS)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of Classics offers a graduate program of study with specializations in Latin or Latin and Greek, leading to the Master of Arts degree. The program provides students with advanced study of the Latin and/or Greek languages and literatures in the context of a broader and deeper knowledge and understanding of Greek and Roman culture and civilization. In addition to advanced courses in language, each student will be required to take coursework in related disciplines outside of the Classics Department. Some individual programs may require more than 30 hours. Students may choose one of two tracks toward the degree: Latin or Latin and Greek. **Potential applicants should be aware that they will not be admitted unless they have reached the advanced undergraduate level in at least one, or preferably both, of the classical languages, Latin and ancient Greek.** Our M.A. alumni go on to a variety of careers, including especially the teaching of Latin in the schools. Many have also gone on to earn doctoral degrees in Classics at universities such as Brown, Michigan, and USC.

Financial Assistance

Teaching assistantships and several categories of fellowships are available for outstanding applicants. Contact the graduate director or the department chair for details.

Contact

Francisco Barrenechea
Associate Professor and Director of Graduate Studies
Department of Classics
University of Maryland
College Park, MD 20742

Telephone: 301.405.8670
Email: fbarrene@umd.edu

Website: http://www.classics.umd.edu

Courses: CLAS (https://academiccatalog.umd.edu/graduate/courses/clas/) GREK (https://academiccatalog.umd.edu/graduate/courses/grek/) LATN (https://academiccatalog.umd.edu/graduate/courses/latn/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationclas2021.pdf)
- Writing Sample

In addition to the general requirements for admission established by the Graduate School (see "General Information" section in this catalog), applicants must demonstrate a proficiency in translating the ancient language(s) at the advanced undergraduate level.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	August 16, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas immigrants	February 1, 2022	September 30, 2021

RESOURCES AND LINKS:
Program Website: classics.umd.edu (http://www.classics.umd.edu)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Classics, Master of Arts (M.A.) (p. 122)

Facilities and Special Resources

The Baltimore-Washington, D.C., area boasts of several outstanding classical libraries. Located in Washington, D.C., are the Center for Hellenic Studies, the Byzantine Library of Dumbarton Oaks, and the Library of Congress. Students may also use the Eisenhower Library on the campus of the Johns Hopkins University in Baltimore.

Clinical Audiology, Doctor of Audiology (Au.D.)

The Au.D. curriculum meets requirements specified in the Standards for the Certificate of Clinical Competence in Audiology of the American Speech-Language-Hearing Association, as well as those required for Board Certification in Audiology from the American Board of Audiology.Doctoral students are required to complete 93 credits including 61 credits of coursework and 32 credits of Clinical Registration requirements.

Clinical registration requirements include 14 credit hours of clinical practicum registration, and 18 credit hours of full-time clinical internship registration. Full-time students are expected to complete the program in four years.

Advance to Candidacy: In addition to completing the coursework requirements, students must successfully pass comprehensive exams administered during the first three years of the program, as well as complete a four-credit doctoral capstone research project in order to advance to candidacy by the end of their third year in the program.

Post-Candidacy: Students complete 18 credits in a clinical internship residency.

Course	Title	Credits
Core Requirements		
HESP600	Instrumentation in Hearing and Speech Sciences	3
HESP634	Anatomy and Physiology of the Auditory and Vestibular Systems	3
HESP722	Psychoacoustics	3
HESP724	Research Design	3
HESP606	Basic Hearing Measurements	3
HESP630	Electrophysiological Measurements	3
HESP632	Medical Audiology	3
HESP635	Aural Rehabilitation/Habilitation	3
HESP636	Geriatric Audiology	3
HESP645	Pediatric Audiology	3
HESP704	Audiology Practice Management (Audiology Practice Management)	3
HESP700	Hearing Aids	3
HESP701	Hearing Aids II	3
HESP706	Advanced Clinical Audiology	3
HESP710	Industrial and Environmental Noise Problems	3
HESP730	Vestibular-ocular Assessment and Management (Electrophysiologic Measures II)	3
HESP712	Cochlear Implants and Other Implantable Technologies	3
HESP615	Counseling in Communicative Disorders	3
EDMS645	Quantitative Research Methods I	3
or PSYC601	Quantitative Methods I	
HESP849	Capstone Research Project I	2
HESP859	Capstone Research Project II	2
Clinical Registration Requirements:		
HESP649	Clinical Practice in Audiology (HESP649A - Diagnostic Procedures)	8
HESP649	Clinical Practice in Audiology (HESP649B - Aural Rehabilitation)	1
HESP729	Advanced Clinical Practice in Audiology	4
HESP731	Seminar in Clinical Supervision (Seminar in Clinical Supervision)	1
HESP829	Clinical Internship Residency	18
Total Credits		**93**

Clinical Audiology, Doctor of Audiology and Doctor of Philosophy (dual degree) (Au.D./Ph.D.)

Doctoral students are required to complete 110 credits including 78 credits of coursework and 32 credits of Clinical Registration Requirements. Students must also successfully pass the comprehensive exams.

The Dual-degree (Au.D./Ph.D.) program requires 60 credit hours of graduate coursework, 6 credit hours of pre-candidacy research, 12 credit hours of dissertation research, 14 credit hours of clinical practicum registration, and 18 credit hours of full-time clinical internship registration, for a total of 110 credit hours. The Dual-degree program is designed to meet requirements specified in the Standards for the Certificate of Clinical Competence in Audiology of the American Speech-Language-Hearing Association and in the Handbook for Board Certification in Audiology of the American Board of Audiology. The program also meets all requirements of the Graduate School. Ph.D. students must develop an individual study plan with the approval of a faculty Program Planning Committee, pass comprehensive examinations, and complete a dissertation and oral defense. Full-time students are expected to complete the program in approximately 6 years. Students will earn an Au.D. degree on the way to the Ph.D. degree after they have successfully completed academic coursework, pre-candidacy research, clinical practicum, the 4th-year clinical externship, and comprehensive examinations. The Department of Hearing and Speech Sciences also offers the traditional Doctor of Philosophy degree, with major emphasis in either speech, language or hearing, for those students seeking careers in research or higher education without clinical training. For information about the Ph.D. in Hearing and Speech Sciences (http://apps.gradschool.umd.edu/Catalog/public-programs-detail.php?HESP), please see HESP (http://apps.gradschool.umd.edu/Catalog/public-programs-detail.php?HESP).

Course	Title	Credits
Core Requirements		
HESP600	Instrumentation in Hearing and Speech Sciences	3
HESP634	Anatomy and Physiology of the Auditory and Vestibular Systems	3
HESP722	Psychoacoustics	3
HESP724	Research Design	3
HESP606	Basic Hearing Measurements	3
HESP630	Electrophysiological Measurements	3
HESP632	Medical Audiology	3
HESP635	Aural Rehabilitation/Habilitation	3
HESP636	Geriatric Audiology	3
HESP645	Pediatric Audiology	3
HESP700	Hearing Aids	3

HESP701	Hearing Aids II	3
HESP706	Advanced Clinical Audiology	3
HESP730	Vestibular-ocular Assessment and Management (Electrophysiologic Measures II)	3
BIOL600	Ethics in Scientific Research	2
Select one of the following:		6
EDMS645 & EDMS646	Quantitative Research Methods I and General Linear Models I	
PSYC601 & PSYC602	Quantitative Methods I and Quantitative Methods II	
Electives		10
HESP898	Pre-Candidacy Research	6
Clinical Registration Requirements:		
HESP649	Clinical Practice in Audiology (HESP649A - Diagnostic Procedures)	8
HESP649	Clinical Practice in Audiology (HESP649B - Aural Rehabilitation)	1
HESP729	Advanced Clinical Practice in Audiology	4
HESP731	Seminar in Clinical Supervision (Seminar in Clinical Supervision)	1
HESP829	Clinical Internship Residency	18
Dissertation Research Requirements		
HESP899	Doctoral Dissertation Research	12
Total Credits		**110**

Clinical Audiology (CAUD)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

Advanced graduate study in clinical audiology, available through the Department of Hearing and Speech Sciences within the College of Behavioral and Social Sciences, consists of the Doctor of Audiology program (CAUD) in which students earn the Au.D. degree. This doctoral program is available to post-baccalaureate students who have completed undergraduate pre-requisites in hearing and speech sciences/communication sciences and disorders. The CAUD program is an academically based, clinically oriented program designed primarily to prepare professional Audiologists. While information pertaining to hearing disorders comprises the central focus of the degree, education about the normal processes of communication, as well as about research design, is considered an integral part of the program. Students completing the program are eligible to obtain the Certificate of Clinical Competence in Audiology (CCC-A) of the American-Speech-Language-Hearing Association, Board Certification in Audiology by the American Board of Audiology (ABA), and licensure in the State of Maryland and other states. A Ph.D. in Audiology is also available to those students who have already completed a graduate degree in Audiology (i.e., Au.D. degree or M.A. degree). A dual-degree program is available to CAUD students, in which they earn the Au.D. degree and continue their study immediately for the Ph.D. degree. Those students in the program who wish to pursue the dual-degree program will earn the Au.D. at the point in doctoral training when they have completed all of the academic, clinical, and research requirements for this first professional degree.

(Note: Applicants for the M.A. program in Speech-Language Pathology, please see SPLA; Applications for the Hearing and Speech Sciences Ph.D., please see HESP).

Additional information about the program's highlights can be found at the link below.
https://hesp.umd.edu/content/program-highlights-doctoral-program-clinical-audiology (https://hesp.umd.edu/content/program-highlights-doctoral-program-clinical-audiology/)

Financial Assistance

A limited number of graduate assistantships are available through the Department. Assistantships that carry teaching, research or clinical responsibilities are awarded on a competitive basis. Students may also seek assistantships from other units on campus or scholarships sponsored by Federal agencies (e.g., NIDCD) or private foundations (e.g., American Speech-Language-Hearing Foundation; American Academy of Audiology Foundation).

Additional resources for funding opportunities can be found at the link below:
http://hesp.umd.edu/undergraduate/apply-funding (http://hesp.umd.edu/undergraduate/apply-funding/)

Contact

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Website: http://www.hesp.umd.edu

Courses: EDMS (https://academiccatalog.umd.edu/graduate/courses/edms/) HESP (https://academiccatalog.umd.edu/graduate/courses/hesp/)

Relationships: Neurosciences and Cognitive Science (NACS) (p. 312)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://hesp.umd.edu/content/program-highlights-doctoral-program-clinical-audiology/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/umdsupplementaryapplicationcaudsplahespcert.pdf)

- Prerequisites: Completion of at least 60% of undergraduate prerequisite courses prior to application. For a list of pre-requisite courses, please go here (https://hesp.umd.edu/content/application-faqs/).

Admissions to the graduate program in Clinical Audiology is on a very competitive basis. Students admitted to the Au.D. program in Audiology generally have a minimum grade point average of 3.4 from a baccalaureate program in hearing and speech sciences, or related discipline. All applicants to the CAUD graduate program are required to furnish GRE scores taken within the last five years, three letters of recommendation, official transcripts from all undergraduate and graduate studies, and a statement of purpose. Admission to the program is confined to fall matriculation, Prospective applicants should note that decisions on admissions are made in early March. Students must submit application materials for the fall semester by January 5. Applicants with a background in the hearing and speech sciences or a related field are considered for admission to the Au.D., which requires four years of full-time graduate study. We no longer accept students who have not fulfilled their undergraduate requirements. Students interested in the dual degree track (Au.D./Ph.D.) are admitted into the CAUD program and may request to switch to the dual degree program after completion of the 3rd year of study. The time required for completion of the dual-degree track is 6-7 years of full-time graduate study. For more information on the prerequisite course requirements, please see our website: hesp.umd.edu. (https://hesp.umd.edu)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 5, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 5, 2022

RESOURCES AND LINKS:
Other Deadlines: hesp.umd.edu (http://www.hesp.umd.edu)
Program Website: hesp.umd.edu/landing/Graduate (http://www.hesp.umd.edu/landing/Graduate/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Clinical Audiology, Doctor of Audiology (Au.D.) (p. 124)
- Clinical Audiology, Doctor of Audiology and Doctor of Philosophy (dual degree) (Au.D./Ph.D.) (p. 124)

Facilities and Special Resources

The Department's facilities include numerous modern research laboratories equipped to support research in the areas of: acoustic phonetics, psychoacoustics, cochlear implants, hearing aids, infant and adult speech perception, neuropsychology, language, voice, fluency and electrophysiology. There are multiple sound-attenuating chambers and one electrically-shielded chamber devoted to research with humans, which are all integrated with computers and peripheral equipment for acoustic signal development, signal analysis, presentation and on-line data collection.

The Department also houses the Hearing and Speech Clinic (https://hespclinic.umd.edu/) at UMCP. this clinic serves as the initial practicum site for all students pursuing clinical training. The Clinic includes multiple audiological test suites equipped for diagnostic testing, a complete hearing aid dispensary, a group rehabilitation room, and state-of-the-art equipment for behavioral and electrophysiological diagnostic testing, as well as hearing aid selection and fitting and cochlear implant programming. Ten speech and language diagnostic and therapy rooms are integrated with observation areas; and an on-site language pre-school (LEAP, the Language-Learning Early Advantage Program), also equipped for observation. Students pursuing clinical training in Audiology will also have access to the Audiology Service, Division of Audiology-Head and Neck Surgery, of the University of Maryland and University Hospital in Baltimore (UMB), for part-time clinical rotations or full-time clinical externships. This Service provides a full range of auditory and vestibular diagnostic and rehabilitative services in a large metropolitan hospital setting. Students also engage in clinical activities in the Audiology Section of the Clinical Center as well as intramural research programs of the National Institute on Deafness and Other Communication Disorders of the National Institutes of Health.

All of the clinical and research facilities are potentially available for the conduct of student-directed research projects, or for student participation in faculty-initiated research projects. Additional research and clinical opportunities are available at Walter Reed National Military Medical Center, the Johns Hopkins University School of Medicine, and at other facilities in the Washington and Baltimore metropolitan areas. The Library of Congress, the National Library of Medicine and the libraries of various medical schools in the Washington-Baltimore area supplement the University's extensive libraries at College Park. The Department of Hearing and Speech Sciences participates in the Center for the Comparative and Evolutionary Biology of Hearing Training Program (C-CEBH), the Neuroscience and Cognitive Sciences graduate program (see NACS), the Maryland Language Science Center, and the Cochlear Implant Center on Excellence (MCICE); these connections afford students the opportunity to work with faculty in other departments at the University of Maryland, College Park, or at UMB.

Clinical Psychological Science, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits

Course	Title	Credits
Core Requirements		
PSYC622	Research Methods in Clinical Psychology	3
PSYC623	Child Psychopathology	3
PSYC624	Adult Psychopathology	3
PSYC625	Clinical Assessment: Psychometric Principles, Testing and Behavior	3
PSYC630	Behavioral and Cognitive Behavioral Intervention for Adults	3
PSYC632	Behavioral and Cognitive Behavioral Intervention for Children and Adolescents	3

PSYC643	Ethics and Foundations of Assessment and Clinical Intervention	3
PSYC644	Basic Foundation of Clinical Interventions	3
PSYC650	Culture and Diversity in Mental Health	3
PSYC651	Writing and Critical Thinking	3
Total Credits		**30**

Clinical Psychological Science (MPPS)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The University of Maryland is proud to offer a Master of Professional Studies (MPS) in Clinical Psychological Science, the only master's-level degree that focuses explicitly on clinical psychological science. The goal of the MPS program is to provide rigorous training in clinical psychology, including coursework in evidence-based psychological assessment and interventions, as well as state-of-the-art research methods and critical thinking skills. Students take 10 courses (two per term) over the course of 15 months. Courses are taught in the evenings at the College Park campus and are designed for working professionals who desire advanced knowledge in clinical science to enter, advance, or expand their career options in the mental health field.

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Courses: PSYC (https://academiccatalog.umd.edu/graduate/courses/psyc/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdstatementofpurposeformpps.pdf)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students) (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/)

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (2)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementalapplicationmpps.pdf)
- Writing Sample (optional)
- Admissions Interview

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	March 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	February 1, 2022

RESOURCES AND LINKS:
Program Website: psychology.umd.edu (https://psyc.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Clinical Psychological Science, Master of Professional Studies (M.P.S.) (p. 126)

Facilities and Special Resources

Classes are held at the College Park campus in the evenings, after traditional working hours.

Communication, Master of Arts (M.A.)

The Department of Communication is not currently admitting students whose terminal degree objective is the M.A.

Communication, Doctor of Philosophy (Ph.D.)

Advance to Candidacy: Course requirements include work in a cognate discipline and research methods. In addition students must successfully pass a comprehensive examination that certifies mastery of disciplinary knowledge and preparation for independent research

Post-candidacy: In order to advance to candidacy, students must complete and successfully defend a dissertation that advances knowledge of communication.

Requirements for Students entering with a B.A./B.S. in Communication

Course	Title	Credits
Core Requirements		
COMM700	Introduction to Graduate Study in Communication	3
Cognate Area Outside Department		6
Area of Specialization		15
Select one of the following:		3
COMM602	Communication Theory	

COMM630	Seminar in Public Relations Management	
COMM652	Contemporary Rhetorical Theory	
Select one of the following course sequences:		12
Quantitative:		
COMM701	Quantitative Methods in Communication Research	
Select nine additional credits in quantitative methods and statistics		
Historical/Critical:		
COMM711	Historical/Critical Methods in Communication Research	
COMM712	Advanced Historical/Critical Methods in Communication Research	
Select six additional credits in methods and foundations		
Qualitative:		
COMM714	Introduction to Qualitative Methods in Communication Research	
COMM715	Advanced Qualitative Methods in Communication Research	
Select six additional credits in methods and foundations		
Dissertation Research Requirements		
COMM899	Doctoral Dissertation Research	12
Total Credits		**51**

Requirements for Students entering with a M.A. in Communication

Course	Title	Credits
Core Requirements		
Cognate Area Outside Department		6
Area of Specialization		9
Select one of the following course sequences:		12
Quantitative:		
COMM701	Quantitative Methods in Communication Research	
Select nine additional credits in quantitative methods and statistics		
Historical/Critical:		
COMM711	Historical/Critical Methods in Communication Research	
COMM712	Advanced Historical/Critical Methods in Communication Research	
Select six additional credits in methods and foundations		
Qualitative:		
COMM714	Introduction to Qualitative Methods in Communication Research	
COMM715	Advanced Qualitative Methods in Communication Research	
Select six additional credits in methods and foundations		
Dissertation Research Requirements		
COMM899	Doctoral Dissertation Research	12
Total Credits		**39**

Communication (COMM)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of Communication is committed to communication for the public good. Faculty members and graduate students in the Department pursue and produce research that spans a wide range of the Communication discipline, generally focused in three broad curriculum areas:

- Communication Science & Social Cognition,
- Public Relations & Strategic Communication, and
- Rhetoric & Political Culture.

The Department encourages applications for graduate study from students wishing to pursue interests identified within these foci. The graduate program in Communication is designed for students whose educational objective is the Ph.D. degree (currently the program does not admit students whose degree objective is the M.A.) Most graduates of the doctoral program pursue academic careers; however, some work in public policy research and other professions requiring highly developed research skills.

Financial Assistance

Most departmental financial aid is in the form of graduate assistantships. However, a limited number of fellowships are available.

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Website: http://www.comm.umd.edu

Relationships: English Language and Literature (ENGL) (p. 182)

Courses: COMM (https://academiccatalog.umd.edu/graduate/courses/comm/)

Admissions
GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample: This could be a research paper.
- Description of Research Interests: Describe in detail your primary research interests with reference to specific studies you have conducted in the past and/or plan to carry out in the future. Please also discuss your future career goals. This should be 2-4 pages. Please upload in the Uploads Requirements page of the online application.

Students must hold a Bachelor's or Master's degree (or the equivalent) prior to enrollment in the Ph.D. program. Although most applicants to the program will have earned a degree in the communication field, others with an interest in studying communication may be admitted (with the possibility of additional courses assigned to remedy deficiencies). Admission to the Ph.D. program is based on the student's prior academic record, letters of recommendation, statement of purpose and research interests, sample of scholarly writing, and other information relevant to the applicant's likelihood of successfully completing the program.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 5, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 5, 2022

RESOURCES AND LINKS:
Other Deadlines: comm.umd.edu (http://www.comm.umd.edu)
Program Website: https://communication.umd.edu/academics/graduate (https://communication.umd.edu/academics/graduate/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Communication, Doctor of Philosophy (Ph.D.) (p. 127)
- Communication, Master of Arts (M.A.) (p. 127)

Facilities and Special Resources

The Department of Communication houses a Center for Health and Risk Communication (http://www.healthriskcenter.umd.edu); a Center for Political Communication and Civic Leadership (http://www.comm.center.umd.edu); and an Oral Communication Center (https://communication.umd.edu/academics/undergraduate/oral-communication (https://communication.umd.edu/academics/undergraduate/oral-communication/)). The campus provides extensive computer resources and excellent library collections in communication. In addition, the Washington metropolitan area provides research and laboratory facilities for studying communication unmatched by other departments in the discipline.

Communication Management, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Communication Management (Z045)

Graduate Certificate Program
College: Arts and Humanities

Contact

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Website: http://www.comm.umd.edu

Courses: COMM (https://academiccatalog.umd.edu/graduate/courses/comm/)

Admissions
Admissions Information

This certificate is not currently accepting students. Please visit our program listing (p. 19) to view other certificates.

Requirements

- Communication Management, Post-Baccalaureate Certificate (P.B.C.) (p. 129)

Community Counseling, Master of Arts (M.A.)

Please visit the department website.

Community Counseling, Master of Education (M.Ed.)

Please visit the department website.

Community Counseling (COCM)

Graduate Degree Program
College: Education

Website: http://www.education.umd.edu

Admissions

Admissions Information

This program is not currently accepting students. Please visit our program listing (p. 19) to view other programs.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Not accepting applications for Fall 2018
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Not accepting applications for Fall 2018

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Community Counseling, Master of Arts (M.A.) (p. 129)
- Community Counseling, Master of Education (M.Ed.) (p. 130)

Community Planning, Master of Community Planning (M.C.P.)

Non-thesis only (capstone project required): 48 credits

Graduation requires satisfactory completion of 48 credits of course work. The 24 credits in core courses introduce students to the foundations of city and regional planning, research methods, planning process, planning history and theory, and the physical and socio-economic functions of cities and regions. Nine additional credits are required for a specialization. Specializations include community development, housing, economic development, international planning, land use / environmental planning, social planning, historic preservation, and transportation planning. A studio and internship are required. Courses are listed under URSP. The MCP program accepts up to nine credits from other graduate programs. Applicants to this program should use the CMPL program code.

Course	Title	Credits
Core Requirements		
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics	3
URSP688	Recent Developments in Urban Studies (URSP688Z - Planning and Design in the Multicultural Metropolis)	3
or URSP673	Community Development	
URSP688	Recent Developments in Urban Studies (URSP688L - Planning Technology)	3
URSP708	Community Planning Studio	6
URSP709	Field Instruction	0
Area of specialization		9
Electives		9
Specialization Options		
Community Development		
Local and Community Economic Development Housing		
International Urban and Regional Development Planning		
Land Use and Environmental Planning		
Social Planning, Organization and Administration		
Transportation Planning		
Total Credits		**48**

Community Planning (CMPL)

Graduate Degree Program
School of Architecture, Planning and Preservation

Abstract

The Urban Studies and Planning Program offers graduate study leading to the Master of Community Planning (MCP) degree. (The School of Architecture, Planning and Preservation, in which the MCP program is located, offers a Ph.D. in Urban and Regional Planning and Design -- see URPD for details). The MCP Program is accredited by the Planning Accreditation Board of the American Institute of Certified Planners and the Association of Collegiate Schools of Planning. Dual Masters degrees in Planning and Architecture, Planning and Historic Preservation, and Planning and Landscape Architecture are offered. There is a transfer of credit agreement with the School of Law on the Baltimore campus as part of a joint JD and MCP program. There is also a cooperative program with the PhD program in Policy Sciences at the UMBC campus. Entering students have diverse academic backgrounds, such as architecture, fine arts, English, history, business, geography, sociology, economics, and political science. The Program's faculty specialize in metropolitan and regional planning, housing, transportation planning, environmental and land use planning, social policy, quantitative planning methods, urban design, and economic development planning. Employment opportunities remain strong for graduates in a highly competitive field. The Baltimore-Washington metropolitan region offers diverse employment potential in urban planning and program management in the public, private, and non-profit sectors.

Financial Assistance

Aside from student loans through the university, MCP students are eligible to apply for graduate assistantships with URSP and the National Center for Smart Growth Research and Education. MCP applicants who are also Peace Corps veterans are eligible to apply for the Shriver Peaceworker fellowship program that is administered by the University

of Maryland Baltimore County. Please note that competition is high for these financial awards. The program also maintains a list of internships, and many of our students work in part- or full-time jobs while completing the program. Program classes are scheduled to begin at 4:00 p.m. and 7:00 p.m. to accommodate our working students.

Contact

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Website: http://www.arch.umd.edu

Courses: URSP (https://academiccatalog.umd.edu/graduate/courses/ursp/)

Relationships: Architecture (ARCH) (p. 51)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Samples (optional, up to 3)
- Portfolio PDF Upload (optional)

The application process consists of the following:

- First, fill out the on-line application for the University of Maryland Graduate School. The administrative code for the Community Planning program is "CMPL."
- Second, submit all transcripts, three professional letters of recommendation, statement of purpose, resume, official GRE test scores, and portfolio as part of the application.

All applicants must have a bachelor's degree from an accredited institution. There is no restriction on the applicants' previous field of study, and indeed we encourage diversity in all senses

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 19, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 19, 2022

RESOURCES AND LINKS:
Program Website: http://www.arch.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Community Planning, Master of Community Planning (M.C.P.) (p. 130)

Facilities and Special Resources

The University of Maryland is an excellent location for the pursuit of community planning, and graduate students are encouraged to take advantage of the opportunities. The university is eight miles from the incomparable library and research facilities of Washington, D.C. In the nations's capital, UMCP graduate students have access to, among other resources, the Library of Congress, the specialized collections of professional associations and international organizations, and agencies at all levels of government. The College Park campus is a 45-minute drive from Baltimore City, whose planning programs have gained national attention. At least two planning studio courses are offered each year, in either Baltimore, the Washington metropolitan area, or an international setting. Baltimore city and Washington, D.C. are ideal laboratories for students interested in research on urban issues and planning.

Urban Studies and Planning is one of five graduate degree programs in the University's School of Architecture, Planning, and Preservation. The School administers the National Center for Smart Growth Research and Education, which involves faculty and graduate students from several campus units in: multi-disciplinary research on the fiscal, environmental and social impacts of alternative development patterns; evaluation of growth management strategies (with a focus on Maryland's Smart Growth programs); technical assistance to state agencies and local jurisdictions; and training programs for federal program managers and state and local officials.

Community Planning and Historic Preservation, Master of Community Planning and Master of Historic Preservation (dual degree) (M.C.P. and M.H.P.)

Non-thesis only: 63 credits required

Course	Title	Credits
Historic Preservation courses		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3

HISP655	American Vernacular Architecture	4
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
HISP690	Historic Preservation Professional Practice (Preservation Management and Practice)	2
HISP710	Final Project in Historic Preservation I	1
HISP711	Final Project in Historic Preservation II	2
HISP650	Historic Preservation Studio Workshop	6
or URSP708	Community Planning Studio	
Internship		0
Community Planning courses		
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics	3
URSP688	Recent Developments in Urban Studies (URSP 688Z - Planning and Design in the Multicultural Metropolis)	3
or URSP673	Community Development	
URSP688	Recent Developments in Urban Studies (URSP688L Planning Technology)	3
URSP Elective		3
Total Credits		**63**

Community Planning and Historic Preservation (CPHP)

Graduate Degree Program
School of Architecture, Planning and Preservation

Abstract

The dual degree combines course work from the Historic Preservation and Urban Studies and Planning programs to enable a student to complete both the Master of Historic Preservation and Master of Community Planning degrees with fewer credits than it would take to complete the two separately.

Students of the dual-degree program are ideally prepared to practice at the intersection of planning and preservation, disciplines that have long had close ties. For example, the Maryland Historical Trust, Maryland's State Historic Preservation Office is housed with the state's planning department. Similarly, preservation is imbedded in the planning offices in Baltimore City, and county's such as Prince Georges and Montgomery. Graduates of this program are prepared to practice in either discipline (a strength in times of economic recession) and, more importantly, are able to bring their special knowledge and understanding to preservation planning issues in communities across the state and nation.

Financial Assistance

The School of Architecture, Planning, and Preservation offers a limited and varying number of teaching and research assistantships, scholarships, fellowships, and internships. Applicants should apply for financial assistance when submitting the application for admission. Scholarship determinations are made at the time of application and admission. Scholarships are generally awarded on a per course basis and commitments are made at the time of admission and apply to the entire program, subject to academic performance. Periodically there are named scholarships provided by various organizations or companies.

In addition, there are work opportunities both on, and off campus, and they are relatively plentiful. However, students in the dual degree program may find it difficult to complete their degree requirements timely if they are working off campus, or more than 10 hours per week.

Applicants should inquire as to the availability of funding for the term they are starting.

Contact

Find additional information on program offerings, degree requirements, admissions, and financial aid on the School's Web site (www.arch.umd.edu (http://www.arch.umd.edu)). Schedule a visit and tour online at: http://arch.umd.edu/arch/prospective-students-arch (http://arch.umd.edu/arch/prospective-students-arch/).

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Fax: 301.314.9583
Email: jcwells@umd.edu

Website: http://www.arch.umd.edu **(**http://www.arch.umd.edu/**)**

Relationships: Architecture (ARCH) (p. 51) Real Estate Development (MPRE) (p. 346)

Courses: URSP (https://academiccatalog.umd.edu/graduate/courses/ursp/) HISP (https://academiccatalog.umd.edu/graduate/courses/hisp/)

Admissions

General Requirements

- Statement of Purpose: In addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample (one required, up to two more optional): A writing sample of at least 10-30 pages. This can be previous individual academic or professional work. It does not necessarily have to be related to historic preservation or community planning, however a related topic is preferred. The writing sample should demonstrate the ability to analyze a problem/question and clearly communicate your findings. Upload to the Writing Sample section of the Uploads Requirements page in the online application.
- Portfolio PDF Upload (optional)
- Must be admitted by both programs to pursue dual degree.

The administrative code for the dual degree of Master of Community Planning and Master of Historic Preservation is "CPHP." Applicants must be admitted by both programs to pursue this dual degree but only one application is required.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 19, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 19, 2022

RESOURCES AND LINKS:
Program Website: http://www.arch.umd.edu (http://www.arch.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Community Planning and Historic Preservation, Master of Community Planning and Master of Historic Preservation (dual degree) (M.C.P. and M.H.P.) (p. 131)

Facilities and Special Resources

The School of Architecture, Planning and Preservation is ideally located between Washington, DC, and Baltimore and surrounded by a number of historic communities and a varied physical environment. The resulting opportunity for community planning and historic preservation is unsurpassed.

The School's library contains some 57,000 monographs and 6,000 current periodicals, making it one of the major architectural libraries in the nation. The National Trust Library for Historic Preservation, housed in McKeldin Library, contains 11,000 volumes and 450 periodical titles. The Colvin Institute holds the entire library offerings of the Urban Land Institute and access to all the case studies published by ULI. The interdisciplinary National Center for Smart Growth Education and Research is based in the School offering perspectives and opportunities to engage important issues facing urban and regional planning as well as historic preservation.

Community Planning and Law, Master of Community Planning and Juris Doctorate (dual degree) (M.C.P. and J.D.)

Non-thesis only: 48 credits required for the M.C.P.

The University of Maryland School of Law on the Baltimore campus (UMB) will accept up to 9 credits of MCP coursework towards the J.D. degree, and the Urban Studies and Planning Program will accept up to 9 credits of J.D. coursework towards the MCP degree. Applicants must apply to each program separately and be accepted by both programs. Credits from the MCP program can be transferred to the Law program only if they are taken while the student is enrolled in the Law program, and vice versa. Applicants interested in this joint program should use the LCPL code when applying to the Urban Studies and Planning Program.

Course	Title	Credits
Core Requirements		
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics	3
URSP688	Recent Developments in Urban Studies (URSP688Z - Planning and Design in the Multicultural Metropolis)	3
or URSP673	Community Development	
URSP708	Community Planning Studio	6
URSP688	Recent Developments in Urban Studies (URSP688L - Planning Technology)	3
URSP709	Field Instruction	0
Electives		9
Specialization Options		
Select one of the following options:		9
Local and Regional Economic Development		
Land Use and Environmental Planning		
Transportation Planning		
Total Credits		**48**

Community Planning and Law (LCPL)

Graduate Degree Program
College: Architecture

abstract

The University of Maryland School of Law on the Baltimore campus (UMB) will accept up to 9 credits of MCP coursework towards the JD degree, and the Urban Studies and Planning Program will accept up to 9 credits of JD coursework towards the MCP degree. This means that students who complete both programs can save up to 18 credits. Applicants must apply to each program separately and be accepted by both programs. Only grades of B or better may be transferred. Credits from the MCP program can be transferred to the Law program only if they are taken while the student is enrolled in the Law

program and vice versa. This means that students cannot take advantage of the transfer of credits if they have already completed either of the programs.

Contact

Casey Dawkins, Ph.D.
Director of Graduate Studies
School of Architecture, Planning, & Preservation
Urban Studies and Planning Program
1112-H Preinkert Hall
7480 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6795
Email: dawkins1@umd.edu

Website: http://www.arch.umd.edu

Courses: URSP (https://academiccatalog.umd.edu/graduate/courses/ursp/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Portfolio PDF Upload (optional)
- Writing Samples (optional - up to 3)
- Must apply to the M.C.P. and law programs separately and be accepted by both programs

Applicants for the dual degree in Community Planning/Juris Doctor should use following four-letter code on the online application: LCPL

For more information about the law program, visit The University of Maryland School of Law (https://www.law.umaryland.edu/). For the statement of purpose, in addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs. The Law School Admission Test (LSAT) is required and must be submitted directly to the Maryland School of Law.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 8, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 19, 2022

RESOURCES AND LINKS:
Program Website: www.arch.umd.edu/ursp/dual-degrees-ursp (http://www.arch.umd.edu/ursp/dual-degrees-ursp/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Community Planning and Law, Master of Community Planning and Juris Doctorate (dual degree) (M.C.P. and J.D.) (p. 133)

Comparative Literature, Doctor of Philosophy (Ph.D.)

The Ph.D. degree normally entails at least 30 credits of course work (beyond M.A. courses) and 12 credits of dissertation research. Advising will address the depth, breadth, and coherence of each student's course plan and, if necessary, coordination among different histories of the early modern and modern.

Advance to Candidacy: In addition to the course requirements below, students must successfully pass a Qualifying Exam, as well as fulfill a language requirement. This requirement can be met in various ways (prior coursework, translation test, or a degree in language).

Post-Candidacy: Students must complete at least 12 credits of CMLT899 and successfully defend and submit a dissertation.

Course	Title	Credits
Core Requirements		
ENGL602	Critical Theory and Literary Criticism	3
ENGL611	Approaches to College Composition	3
Historical Perspectives course		3
Two CMLT seminars		6
Remainder of coursework		15
Dissertation Research Requirements		
CMLT899	Doctoral Dissertation Research	12
Total Credits		**42**

Comparative Literature (CMLT)

Graduate Degree Program
College: Arts and Humanities

Abstract

A small, elite PhD degree program housed in the Department of English, the Comparative Literature Program is committed to the comparative and transnational study of literature and other media. Combining its own dynamic resources with those of the English Department and other units in the College of Arts and Humanities, the Program supports a wide range of interests, including Western Hemispheric and Transatlantic Studies, Film, Early Modern Studies, Classical Reception, and Diasporic and Postcolonial Studies. Students in the Program work in at least two languages and national literatures, one of them Anglophone. The Comparative Literature PhD Program complements the current PhD Program in English, giving students a place to pursue true comparative studies. Students seeking admission to the PhD Program in Comparative Literature must demonstrate advanced language proficiency before entry into the Program, and commit themselves to achieving a high degree of intellectual expertise in two or more languages and national literatures.

Graduates are as likely to find academic positions in departments of foreign languages as they are to find them in English. A doctoral degree in Comparative Literature can uniquely prepare them for a profession that more and more studies literatures and cultures within a globalized, transnational context.

Financial Assistance

The Comparative Literature Department, in conjunction with the College of Arts and Humanities and the Graduate School, awards a combination of fellowships and teaching assistantships to admitted PhD candidates..

Contact

Tawes Hall
7751 Alumni Drive
University of Maryland
College Park, MD 20742
Email: englishgrad@umd.edu

Website: http://www.english.umd.edu
Courses: CMLT (https://academiccatalog.umd.edu/graduate/courses/cmlt/) ENGL (https://academiccatalog.umd.edu/graduate/courses/engl/)
Relationships: English Language and Literature (ENGL) (p. 182)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample: A single sample of critical writing of approximately 12-20 pages. While we encourage you to submit your best writing sample, we prefer a writing sample in your declared field of interest. The writing sample should include an updated works cited page to help us evaluate your critical and theoretical familiarity with a field, a period or a genre. (uploaded to the Uploads Requirements section of the application)
- Master's degree

Applicants should have a strong background in arts and humanities. Students will not be admitted to the program without demonstrated proficiency in English and at least one other language. Each student must submit a critical writing sample (in English), three letters of recommendation, evidence of language proficiency, and GRE scores. International applicants must also submit TOEFL scores.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 15, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 15, 2021

RESOURCES AND LINKS:
Program Website: http://www.english.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Comparative Literature, Doctor of Philosophy (Ph.D.) (p. 134)

Facilities and Special Resources

The Comparative Literature Program combines the benefits of a small department with the opportunities available at a large research university located in suburban Washington, D.C. Students have access to such University resources as the rare books and special collections of McKeldin Library, the Women's Studies Graduate Certificate program, and the Meyerhoff Center for Jewish Studies. Area resources include the extensive archival collections of the Library of Congress, the U.S. Archives, and the Folger Institute, as well as museums, galleries, embassies and cultural institutions in the Washington area and in the Baltimore-Philadelphia-New York corridor.

Computational Harmonic Analysis, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications. Please visit our program listing (p. 19) to view other certificates.

Computational Harmonic Analysis (Z023)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

This certificate is not currently accepting applications. Please visit our program listing (p. 19) to view other certificates.

Website: http://www.norbertwiener.umd.edu

Admissions

This certificate is not currently accepting applications. Please visit our program listing (p. 19) to view other certificates.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Program not currently accepting applications	Program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Program not currently accepting applications	Program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.norbertwiener.umd.edu

Requirements

- Computational Harmonic Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 135)

Computational Methods in Atmospheric & Oceanic Science, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Core Requirements		
AOSC630	Statistical Methods in Meteorology and Oceanography	3
AOSC652	Analysis Methods in Atmospheric and Oceanic Science	3
Select two additional courses approved by advisor		6
Total Credits		**12**

Computational Methods in Atmospheric & Oceanic Science (Z048)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

*This program is not currently accepting applications.

Website: http://www.aosc.umd.edu

Courses: AOSC (p. 609)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Requirements

- Computational Methods in Atmospheric & Oceanic Science, Post-Baccalaureate Certificate (P.B.C.) (p. 136)

Computer Networking, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Students must choose at least two courses from the 749-level series of special topics. The remaining two courses can be any of the following:

Course	Title	Credits
Core Requirements		
ENTS689	Special Topics in Telecommunications (ENTS689G - Design and Analysis of Communication Networks)	3
ENTS689	Special Topics in Telecommunications (ENTS689N - Network Programming)	3
ENTS649	Special Topics in Networking	3
ENTS749	Advanced Topics in Networking	3
Total Credits		**12**

Computer Networking (Z117)

Graduate Certificate Program
College: Engineering

Abstract

The Certificate in Computer Networking will only be available to current ENTS students. It will allow ENTS students to have the option of enhancing their MS degree with specific technical knowledge and also enable them to remain competitive in the marketplace with graduates from similar degree programs at peer institutions.

Financial Assistance

Since the Master's in Telecommunications Program does not normally offer financial support in the form of graduate assistantships, many of our students find assistantships in other units, especially non-academic units, which do not have graduate students.

CONTACT

Master's in Telecommunications Program Office
2433 A.V. Williams Building
6223 Paint Branch Drive
University of Maryland

College Park, MD 20742
Telephone: 301.405.3682
Fax: 301.314.9324
Email: telecomprogram@umd.edu

Website: http://www.telecom.umd.edu/

Courses: ENTS (https://academiccatalog.umd.edu/graduate/courses/ents/)

Relationships: Electrical and Computer Engineering (ENEE) (p. 168)

Admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the department website
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department website

Other Deadlines: Please visit the program website at http://www.telecom.umd.edu/

Requirements

- Computer Networking, Post-Baccalaureate Certificate (P.B.C.) (p. 136)

Computer Science, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

Students completing the non-thesis option must complete 30 credits of coursework, comprehensive examinations, and complete a scholarly paper. Students following the thesis option must complete 24 credits of coursework, and 6 credits of master's thesis research.

Course	Title	Credits
Core Requirements		
At least four M.S. qualifying computer science courses at the 600-800 level in four of the eight areas of study are required. A total of 21 credits in CMSC courses must be taken.		24
Thesis or Non-Thesis Requirements		
Select one of the following options:		6
Thesis Option:		
CMSC799	Master's Thesis Research	
Non-Thesis Option:		
Complete a scholarly paper		
Six additional credits of coursework		
Total Credits		**30**

Computer Science, Doctor of Philosophy (Ph.D.)

The program milestones include a six-course qualifying sequence plus two electives, a preliminary oral examination on a dissertation proposal and reading list in three related areas, and the dissertation defense. The number and variety of courses offered each semester enable students and their advisors to plan individualized programs.

Advance to Candidacy: In addition the required coursework, students must successfully pass a preliminary oral exam on a dissertation proposal and reading list in three related areas.

Post-Candidacy: Students must complete at least 12 credits of CMSC899 and successfully defend and submit a dissertation.

Course	Title	Credits
Core Requirements		
Select six 600-800 level courses spread over at least four areas, with no more than three in any one area.		18
Select two additional 600-800 level courses		6
CMSC798	Master's Non-Thesis Research (CMSC798F - How to Conduct Great Research)	1
Dissertation Research Requirements		
CMSC899	Doctoral Dissertation Research	12
Total Credits		**37**

Computer Science (CMSC)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Computer Science Department's graduate program is ranked among the top in the nation and in the top ten among public universities. Both M.S. and Ph.D degrees are offered, and almost all full-time students receive financial aid in the form of assistantships, fellowships, and grants. The Department has strong research programs in the following areas: artificial intelligence, computer systems and networking, database systems, programming languages, software engineering, scientific computing, algorithms and computation theory, computer vision, geometric computing, graphics, human-computer interaction, and bioinformatics.

Financial Assistance

Financial aid, in the form of teaching assistantships, research assistantships, and fellowships, is offered to qualified applicants. Almost all full-time students receive some type of financial aid.

Contact

Graduate Office
Department of Computer Science
1130 Brendan Iribe Center for Computer Science and Engineering
8125 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2662
Email: csgradof@cs.umd.edu

Website: http://www.cs.umd.edu/grad/catalog (http://www.cs.umd.edu/grad/catalog/)

Courses: CMSC (p. 687)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional for Fall 2021)
- GRE Subject (optional)
- Miller Analogies Test (optional for M.S., not required for Ph.D.)
- CV/Resume
- Writing Sample (optional for Ph.D., not required for M.S.)
- Maryland Max Planck Ph.D. Program: Students interested in applying to the Maryland Max Planck Ph.D. Program in Computer Science should follow the admissions instructions for the program (https://www.cs.umd.edu/maryland-max-planck/admissions/).

A strong background in mathematics and theoretical computer science is necessary.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	December 17, 2021	October 4, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 17, 2021	October 4, 2021

RESOURCES AND LINKS:
Program Website: http://www.cs.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Computer Science, Doctor of Philosophy (Ph.D.) (p. 137)
- Computer Science, Master of Science (M.S.) (p. 137)

Facilities and Special Resources

The computer science department, located in the Brendan Iribe Center for Computer Science and Engineering, provides general purpose computing support to advance the academic and research mission of the department.

The department operates a data center in the AV Williams building with multiple 10 Gbps connections to the campus and national research networks. In addition to the primary data center, the department oversees a co-location facility for research groups wanting hands-on management of their own specialized equipment.

General purpose computing is provided via a RedHat Enterprise Virtualization environment. The system provides four compute nodes, each with at least 16 cores and 128GB of RAM. The cluster has 14 TB of shared disk. Nodes are connected to each other and the file system by multiple 10 Gbps Ethernet links.

Computing Systems, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
ENTS689	Special Topics in Telecommunications (ENTS689A - Algorithms and Data Structures)	3
ENTS669	Special Topics in Computing (ENTS669A - Embedded Systems)	3
ENTS669	Special Topics in Computing (ENTS669B - Distributed Systems in a Virtual Environment)	3
ENTS669	Special Topics in Computing (ENTS669D - Introduction to Machine Learning)	3
Total Credits		**12**

Computing Systems (Z118)

Graduate Certificate Program
College: Engineering

abstract

The aim of the Graduate Certificate in Computing is to extend the knowledge and skills of our students in the direction of computing, including algorithms and data structures, embedded and high-performance computing and machine learning.

CONTACT

Master's in Telecommunications Program Office
2433 A.V. Williams Building
University of Maryland,
College Park, MD 20742
Telephone: 301.405.3682
Fax: 301.314.9324
Email: telecomprogram@umd.edu

Website: http://www.telecom.umd.edu (http://www.telecom.umd.edu/)

Admissions

The Certificate in Computing Systems is only available to current Telecommunication students.

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	N/A	N/A

Requirements

- Computing Systems, Post-Baccalaureate Certificate (P.B.C.) (p. 138)

Consecutive Interpreting, Post-Baccalaureate Certificate (P.B.C.)

21 credits required

The Graduate Certificate of Professional Studies in Consecutive Interpreting (GCPS in Consecutive Interpreting) is designed to equip you with the knowledge and skills required for entry-level work in the interpreting profession. Examples include serving as dialogue interpreters for non-specialized content in community, health, legal, and political settings. You will begin to develop high-level skills in consecutive interpreting (oral rendering after the speaker pauses) and will be grounded in the tenets of the profession, including professional conduct and ethics, as you are guided through the steps needed to advance your professional skill set.

The GCPS in Consecutive Interpreting is a one-year 21-credit program offering instruction in the fundamental skills of consecutive interpreting in interpreting studies, the interpreting profession, and intercultural communication.

Two Languages

Course	Title	Credits
Core Requirements		
COMM609	Fundamentals of Interpreting	4
COMM610	Introduction to Translation and Interpreting Studies	3
COMM683	Intercultural Communication Theory	3
COMM619	Consecutive Interpretation	4
COMM730	Seminar in Health Communication	3
or COMM762	The Rhetoric of Political Institutions	
Select up to four credits of the following electives:		4
COMM641	Introduction to Computer-Assisted Translation	
COMM798	Independent Study (Intensive Writing in English)	
COMM798	Independent Study (Public Speaking)	
COMM639	Fundamentals of Translation	
COMM629	Introduction to Simultaneous Interpretation	
COMM730	Seminar in Health Communication (if not taken to fulfill requirement)	
COMM762	The Rhetoric of Political Institutions (if not taken to fulfill requirement)	
Total Credits		**21**

Three Languages

Course	Title	Credits
Core Requirements		
COMM609	Fundamentals of Interpreting	6
COMM610	Introduction to Translation and Interpreting Studies	3
COMM683	Intercultural Communication Theory	3
COMM619	Consecutive Interpretation	6
COMM730	Seminar in Health Communication	3
or COMM762	The Rhetoric of Political Institutions	
Total Credits		**21**

Consecutive Interpreting (Z080)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The Graduate Certificate of Professional Studies in Consecutive Interpreting (GCPS in Consecutive Interpreting) is designed to equip you with the knowledge and skills required for entry-level work in the interpreting profession. Examples include serving as dialogue interpreters for non-specialized content in community, health, legal, and political settings. You will begin to develop high-level skills in consecutive interpreting (oral rendering after the speaker pauses) and will be grounded in the tenets of the profession, including professional conduct and ethics, as you are guided through the steps needed to advance your professional skill set.

Contact

Esperanza Pombo
Director of Graduate Studies
Interpreting and Translation Program
2123 Skinner Building
4300 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.314.1205
Email: epombo@umd.edu

Yana Carver
Assistant to the Director of Graduate Studies
Interpreting and Translation Program
2123 Skinner Building
4300 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.314.1205
Email: ycarver@umd.edu

Website: http://www.gsit.umd.edu

Relationships: Interpreting (MPIN) (p. 258), Translation (MPTR) (p. 404), Translation (Z079) (p. 405)

Courses: COMM (https://academiccatalog.umd.edu/graduate/courses/comm/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-

requirements/)): A minimum of 6 months proof of residency in a country where your primary acquired language is spoken.

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmptrmpinz079z080z105z1062021.pdf)
- Supplementary Application 2
- Proof of residency: A minimum of 6 months proof of residency in a country where your primary acquired language is spoken.
- Admissions tests (contact oes@umd.edu)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	April 1, 2022	November 17, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	February 16, 2022	August 18, 2021

RESOURCES AND LINKS:
Program Website: http://www.gsit.umd.edu
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Consecutive Interpreting, Post-Baccalaureate Certificate (P.B.C.) (p. 139)

Product Management, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits required

Course	Title	Credits
ENES660	Course ENES660 Not Found (Fundamentals of Product Management)	3
ENES663	Strategies for Managing Innovation	3
ENES664	Business Modeling and Customer Validation	3
ENES665	Innovative Thinking	3
ENES667	Market Development and Commercialization	3
ENES673	Course ENES673 Not Found (Financing the Product Life Cycle)	3
ENES6XX	Course ENES6XX Not Found (Data Analysis and Decision Making)	3
ENES6XX	Course ENES6XX Not Found (Managing Product Development and Production)	3
ENES6XX	Course ENES6XX Not Found (Negotiating and Problem Solving)	3
ENES6XX	Course ENES6XX Not Found (Building and Leading Innovative Organizations)	3
Total Credits		**30**

****The information below is for the proposal and will not appear in the Graduate Catalog****

- ENES660 Fundamentals of Product Management (3 Credits)
- ENES663 Strategies for Managing Innovation (3 Credits)
- ENES664 Business Modeling and Customer Validation (3 Credits)
- ENES665 Innovative Thinking (3 Credits)
- ENES667 Market Development and Commercialization (3 Credits)
- ENES673 Financing the Product Life Cycle (3 Credits)
- ENES6XX Data Analysis and Decision Making (3 Credits)
- ENES6XX Managing Product Development and Production (3 Credits)
- ENES6XX Negotiating and Problem Solving (3 Credits)
- ENES6XX Building and Leading Innovative Organizations (3 Credits)

Product Management (online) (MPCI)

Graduate Degree Program
College: A. James Clark School of Engineering

ABSTRACT

The online Master of Professional Studies (MPS) in Product Management enables learners to build the knowledge, competencies, and relationships to lead the product life cycle from discovery to delivery by:

- Understanding the keys to successfully navigating the roles and responsibilities of being a product manager to champion change with internal and external collaborators and influencers.
- Learning how to truly know your target customer, your customer's underserved needs, your value proposition, your product feature set, and your user experience, then integrate this knowledge into product and market requirements and positioning plans.
- Translating product ideas into tangible assets by creating wireframes, 3D renderings, prototypes, and minimum viable products (MVPs) to test assumptions and validate customer interests.
- Developing techniques for designing and modeling for fast feedback and idea sharing, system optimization with open architectures, validating functions and verifying performance, and leveraging and enabling the system designs, platforms, and ecosystems.
- Embracing modern product leadership to form and motivate product teams, and grow organizations that can both discover and deliver products at scale.

The MPS in Product Management is exclusively designed as a 100% online program without any face-to-face or residency requirements. Students benefit from the global accessibility and time flexibility of fully online learning without the requirement of meeting in a certain place, or at a certain time, on a regular basis. While there is a set syllabus and learning agenda for each week, the recorded lectures may be viewed by students at any time of their choosing each week.

The 30-credit curriculum is completed on a 15-month schedule. Students enroll in two 3-credit courses per 12-week term.

CONTACT

Maryland Technology Enterprise Institute

4467 Technology Dr.
University of Maryland
College Park, MD 20742
Telephone: 301-314-9223
Email: mppm@umd.edu
Program Website: mppm.umd.edu (https://mppm.umd.edu/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (Select International Graduate Students (https://gradschool.umd.edu/education/z069/))
- There are no requirements for the GMAT, GRE, or recommendations.

PROGRAM-SPECIFIC REQUIREMENTS

- Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Admitted students participate 100% as online students. **Immigration documents (F1 or J1 student visas or an I-20) are not required or issued for this fully online program.** In addition to the above minimum qualifications, international students and applicants with foreign credentials have additional requirements per the Office of International Student & Scholar Services (ISSS).

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 30, 2021	January 31, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 30, 2021	January 31, 2022

RESOURCES AND LINKS:

Program Website: mppm.umd.edu (https://mppm.umd.edu/)
Application Process: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Requirements

- Product Management, Master of Professional Studies (M.P.S.) (p. 140)

Counseling & Personnel Services, Certificate of Advanced Study (C.A.S.)

This certificate is not currently accepting applications.

Counseling & Personnel Services (Z901)

Graduate Certificate Program
College: Education

This certificate is not currently accepting students. Please visit our program listing (p. 19) to view other certificates.

Website: http://www.education.umd.edu

Admissions

This certificate is not currently accepting students. Please visit our program listing (p. 19) to view other certificates.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Counseling & Personnel Services, Certificate of Advanced Study (C.A.S.) (p. 141)

Counseling Psychology, Master of Arts (M.A.)

Thesis only: 30 credits required

Students pursing doctoral degrees may earn the M.A. with thesis within the doctoral program while progressing to the Ph.D. The applicant should consult the web page associated with specific CoPE program areas of specialization for further information concerning the relevant entry-level requirements and curriculum.

Course	Title	Credits
Core Requirements		
Statistics courses		6
EDCP799	Master's Thesis Research	6
or PSYC799	Master's Thesis Research	
Remainder of coursework		18
Total Credits		**30**

Counseling Psychology, Doctor of Philosophy (Ph.D.)

Ph.D. students are expected to attain advanced skills as both practitioners and researchers in their area of specialization. All doctoral

students are required to take advanced courses in statistics and research design.

Advance to Candidacy: In addition to the course requirements below, students must successfully pass a comprehensive examination.

Post-Candidacy: Students must complete at least 12 credits in 899 Doctoral Dissertation Research and successfully defend and submit a dissertation. Students must also complete a year long full-time or two year long part-time internship.

Course	Title	Credits
Students must complete courses in the following five areas:		
Individual Difference:		3
PSYC611	Advanced Developmental Psychology	
or PSYC612	Affective Science Perspectives on Temperament & Personality	
or EDHD720	Social Development and Socialization Processes	
Biological Bases of Behavior:		
PSYC606	Human Biopsychology	3
or EDHD775	Human Development and Neuroscience	
Cognitive or Affective Bases of Behavior:		
PSYC607	Advanced Topics in Human-Learning and Cognitive Psychology	
or EDHD721	Cognitive Development and Learning: An Introduction	
or EDHD760	Advanced Educational Psychology	
Social Bases of Behavior:		
PSYC604	Fundamentals of Social Psychology	3
History and Systems:		
EDCP789	Advanced Topics in Counseling and Personnel Services (EDCP789F - History of Mental Health and Psychological Science)	3
or PSYC610	Historical Viewpoints and Current Theories in Psychology	
Remainder of Coursework:		
EDMS646	General Linear Models I	3
EDMS651	General Linear Models II	3
PSYC629	Clinical Laboratory (variable credits)	1-3
or EDCP789	Advanced Topics in Counseling and Personnel Services	
PSYC638	Externship in Professional Psychology (variable credits)	1-3
or EDCP888	Apprenticeship in Counseling and Personnel Services	
EDCP680	Basic Didactic Practicum in Counseling Psychology	3
PSYC/EDCP682	Counseling Psychology Didactic-Practicum in Group Interventions	3
EDCP685	Counseling Psychology Didactic Practicum in Counseling Supervision	3
EDCP686	Counseling Psychology Didactic Practicum in Career Interventions	3
PSYC/EDCP690	Research in Counseling Psychology I	3
PSYC/EDCP691	Research in Counseling Psychology II	3
PSYC/EDCP692	Assessment in Counseling Psychology I	3
EDCP693	Assessment in Counseling Psychology ii	3
PSYC/EDCP695	Ethical and Professional Issues in Counseling Psychology	3
EDCP697	Multicultural Issues in Counseling Psychology	3
PSYC/EDCP698	Advanced Didactic Practicum in Counseling Psychology	3
PSYC/EDCP700	Theories and Strategies of Counseling Psychology	3
PSYC/EDCP799	Master's Thesis Research (at least six credits required)	6
PSYC/EDCP898	Pre-Candidacy Research (variable credits)	1-8
PSYC639	Internship in Professional Psychology	2-3
or EDCP889	Internship in Counseling and Personnel Services	
Dissertation Research Requirements		
PSYC/EDCP899	Doctoral Dissertation Research (after candidacy; 12 credits minimum)	12
Total Credits		**77-89**

Counseling Psychology (COCP)

Graduate Degree Program
College: Education

Abstract

The graduate programs in Counseling Psychology, School Psychology, and Counselor Education (CoPE) include several distinct areas of specialization that are designed to provide the knowledge and skills needed for practice and scholarship in counseling and related human service professions. These fields are concerned with assisting people individually, in groups, and in organizations to attain their optimal level of personal, social, educational, and career functioning. Graduates are employed in a variety of settings including schools, colleges and universities, mental health agencies, business and industry, government agencies, and other community service and practice facilities. Depending on the specific area of specialization and level of training, program graduates may serve as researchers, educators, supervisors, psychologists, counselors, or program administrators.

Master's level professional entry-level training is offered in the School Counseling program, which prepares students to become school counselors in elementary, middle, and high school settings. School counselors are leaders, advocates, and systemic change agents who provide individual and group counseling to school-aged children, develop and implement comprehensive developmental school counseling programs, and collaborate with all key stakeholders, including classroom teachers, school administrators, parents, and community members, to ensure the academic, personal-social, and college-career development of students.

The Ph.D. degree is offered in two areas of specialization:

- Counseling Psychology (in collaboration with the Psychology Department) and
- School Psychology.

Doctoral studies prepare students to achieve exceptional competence in the theory and practice of their field; to develop a high level of skills as researchers, educators and administrators; and to assume positions of leadership in relevant settings. Students in the specialization of Counseling Psychology are prepared to work as researchers, educators, psychologists, and supervisors in such settings as academic departments, college and university counseling centers, and community

mental health agencies. Doctoral-level school psychologists serve as researchers, university faculty, supervisors, administrators, and advanced level practitioners. Program accreditation within CoPE includes: The School Psychology and Counseling Psychology doctoral programs are accredited by the American Psychological Association (APA). The School Psychology doctoral program is approved by the National Association of School Psychologists (NASP), and is also approved for certification by the Maryland State Department of Education. The School Counseling masters program is approved by the Maryland State Department of Education.

Note that, since 2012, the CoPE graduate programs have been part of a new department, the Department of Counseling, Higher Education, and Special Education. The CoPE programs were previously housed in the Department of Counseling and Personnel Services.

The Counseling Psychology **(**https://education.umd.edu/academics/departments/chse/cope/**)** program at the University of Maryland is a joint program between the Department of Counseling and Personnel Services and the Department of Psychology. Our Counseling Psychology Program has been continuously accredited by the American Psychological Association since 1953. In ratings evaluating Counseling Psychology over the past three decades, the University of Maryland is always among the very top ranked programs in the United States. Our faculty represent a broad range of research interests, including psychotherapy process and outcome research, multicultural psychology, vocational psychology, and interpersonal relationships.

For more information please visit our site at http://www.counselingpsychology.umd.edu/counsel2.html

Financial Assistance

The Department of Counseling, Higher Education, and Special Education offers graduate research, teaching, and administrative assistantships on a selective basis to both masters and doctoral students. The Department also assists its students in finding assistantship placements with a variety of on-campus and off-campus units. In addition, a small number of new Ph.D. students are offered highly selective fellowships funded jointly by the Department and the University.

Contact

For additional information and application procedures, please visit our websites:

- http://www.education.umd.edu/CHSE/academics/specialization/
- http://www.education.umd.edu/CHSE (http://www.education.umd.edu/CHSE/)
- https://education.umd.edu/academics/programs/graduate/counseling-psychology-phd (https://education.umd.edu/academics/programs/graduate/counseling-psychology-phd/)

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Carol Scott, Coordinator of Graduate Studies
Department of Counseling, Higher Education, and Special Education
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Website: http://www.education.umd.edu/CHSE/academics/specialization/CounselingPsychology.html

Courses: EDCP (https://academiccatalog.umd.edu/graduate/courses/edcp/)

Relationships: Counseling Psychology (COCP), Higher Education (HIED) (p. 231), International Education Policy (HIEP) (p. 256), School Counseling (COSC) (p. 361), School Psychology (COSP) (p. 363), Special Education (EDSP) (p. 377), Student Affairs (HISA) (p. 383)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/) required)

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationcocp2021.pdf)
- Writing Sample
- Description of Research/Work Experience

Applicants for regular admission to master's degree programs must have an undergraduate GPA of at least B (3.0 on a 4.0 scale) and must submit their scores on the Graduate Record Examination. Applicants for admission to Ph.D. programs should check specific admissions criteria on the program's website. Applicants' undergraduate programs should ordinarily include at least 15 semester hours of coursework in behavioral science fields (e.g., anthropology, education, psychology, sociology, statistics). Selective screening of qualified applicants is necessary in order to limit enrollments to a size that guarantees high quality professional preparation and a close working, professional relationship between faculty and students.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 3, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 3, 2021

RESOURCES AND LINKS:
Program Website: http://www.education.umd.edu/CHSE/academics/specialization/CounselingPsychology.html
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Counseling Psychology, Doctor of Philosophy (Ph.D.) (p. 141)
- Counseling Psychology, Master of Arts (M.A.) (p. 141)

Facilities and Special Resources

All master's, A.G.S., and doctoral students are required to include supervised fieldwork experiences in their degree programs. The Counseling Psychology area of concentration has excellent cooperative relationships with on-campus facilities, such as the Counseling Center and Health Center. Fieldwork may also be done at a wide variety of school systems, colleges and universities, and counseling services and mental health agencies in the Baltimore/Washington metropolitan area, or nationally.

In addition to campus and program resources, students utilize the many major research and professional institutions that are easily accessible to the campus. These include the Library of Congress, the National Library of Medicine, the National Institutes of Health, the Institute of Education Sciences, professional associations such as the American Counseling Association, the American Psychological Association, and the National Association of School Psychologists.

Couple and Family Therapy, Master of Science (M.S.)

Non-Thesis option: 48 credits
Thesis option: 51 credits

Students in the non-thesis option must complete a total of 48 credits including three credits of FMSC789 (https://umd-curr.courseleaf.com/search/?P=FMSC789), and successfully pass the written and oral case presentation. Students in the thesis option must complete 51 credits including six credits of FMSC799 (https://umd-curr.courseleaf.com/search/?P=FMSC799), and successfully pass the written and oral defense of the thesis.

Supervised client contact begins in the student's first semester. Clinical students are required to gain 400 hours of face-to-face client contact, and 250 of these hours must be relational (with couples or families). The Center for Healthy Families, the couple and family therapy clinic operated by the Department, offers the opportunity to gain these hours. Clinical students receive 100 hours of supervision, both individual and group, for their client contact hours. Supervision in the Department's clinic is provided through a range of techniques including case discussion, one-way mirror observation, video review, co-therapy, and telephone consultation during live sessions. Students may choose to do some of their clinical work in a variety of available externship sites in the local area.

Course	Title	Credits
Core Requirements		
SPHL600	Foundations of Public Health	3
FMSC640	Family Therapy: Theory and Techniques	3
FMSC650	Ethical, Legal, and Professional Principles in Couple and Family Therapy	3
FMSC658	Supervised Clinical Practice in Couple and Family Therapy	9
FMSC610	Research Methods in Family Science	3
FMSC651	Treatment of Emotional and Mental Disorders in Family Systems	3
FMSC745	Gender and Ethnicity in Family Therapy and Service Delivery	3
FMSC645	Sexuality: Issues in Family Therapy and Service Delivery	3
FMSC654	Clinical Marriage and Family Therapy Practice	3
FMSC641	Couples Therapy, Theory, and Techniques	3
FMSC642	Normal and Abnormal Individual and Family Development	3
FMSC652	Psychopathology and Diagnosis in Family Systems	3
FMSC653	Advanced Application of CFT Models and Techniques	3
Thesis or Non-thesis option		
FMSC789	Non-Thesis Research	3
FMSC799	Master's Thesis Research	6

Couple and Family Therapy (FCFT)

Graduate Degree Program
College: Public Health

Abstract

The mission of the M.S. in Couple and Family Therapy (CFT) program is to prepare competent, effective therapists for clinical practice and advancement of the marriage and family therapy discipline. The program seeks to train professionals who demonstrate superior therapeutic skills, ethical integrity, intellectual curiosity, and a sincere commitment to working with families from diverse populations.

The Couple and Family Therapy M.S. program provides students with the coursework and supervised clinical training typically required in states with Marriage and Family Therapy licensure. The program is accredited by the Commission on Accreditation for Marriage and Family Therapy Education of the American Association for Marriage and Family Therapy (AAMFT). The CFT program requires 48 credits for the non-thesis option and 51 credits for the thesis option. Completion of the program, which includes the 2-year internship, generally requires 2 years.

The Department of Family Science prepares students to describe, explain, and improve the quality of life through applied research, education, therapy, human services, policy analysis, and advocacy. The approach

is interdisciplinary, emphasizing individual, interpersonal, and social change. The program of study is based on a system or ecological paradigm, combining the perspectives of interrelated professional fields of family science, maternal and child health, couple and family therapy, family policy, behavioral science, and human services. Graduates are prepared for careers in the public, non-profit and private sectors, including university teaching, research, family policy analysis, and administrative positions in human services and public health programs.

Financial Assistance

Graduate Assistantships are available to students admitted into the CFT program.

Contact

For additional information, please contact the Department of Family Science at fmsc@umd.edu (https://academiccatalog.umd.edu/graduate/programs/couple-family-therapy-fcft/fmsc@umd.edu).

Department of Family Science
1142 School of Public Health Building
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Phone: 301.405.3672
Fax: 301.314.9161
Email: fmsc@umd.edu (https://academiccatalog.umd.edu/graduate/programs/couple-family-therapy-fcft/fmsc@umd.edu)

Mariana K. Falconier , Ph.D.
Program Director
Associate Professor
Department of Family Science
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4200 Valley Drive
University of Maryland
College Park, MD 20742
Phone: 301.405.4004
Fax: 301.314.9161
Email: marianak@umd.edu (https://academiccatalog.umd.edu/graduate/programs/couple-family-therapy-fcft/marianak@umd.edu)

Website: http://www.sph.umd.edu/fmsc (http://www.sph.umd.edu/fmsc/)

Courses: FMSC (https://umd-curr.courseleaf.com/graduate/courses/fmsc/)

Admissions

General Requirements

- Statement of purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Samples (one required, up to two more optional)

The Master of Science in Couple and Family Therapy program accepts applications through the TerpEngage Graduate Admissions System (https://terpengage.force.com/community/CustomLoginPage/?GradApp=True).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 3, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 3, 2021

RESOURCES AND LINKS

Program website: https://sph.umd.edu/academics/masters-degrees/ms-couple-and-family-therapy (https://sph.umd.edu/academics/masters-degrees/ms-couple-and-family-therapy/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)

Requirements

- Couple and Family Therapy, Master of Science (M.S.) (p. 144)

Facilities and Special Resources

Center is the training and research arm of the Couple and Family Therapy Program in the Department of Family Science. Departmental graduate students and faculty provide clinical and educational services to families from surrounding communities in this state-of-the-art facility. Master's and doctoral students use data collected at the Center for research projects.

The University's close proximity to the nation's capital, the state capital in Annapolis, federal executive departments, and headquarters of national professional and public interest associations provide research and internship placements for studying family policy unmatched by any other graduate program in the discipline. The Washington-Baltimore metropolitan area offers rich opportunities for research on culturally and socioeconomically diverse families. The campus and department have excellent computer facilities. Students have ready access to the University's extensive library systems, as well as holdings from the Library of Congress, the National Institutes of Health, National Library of Medicine, National Archives, and many other library collections.

Creative Writing, Master of Fine Arts (M.F.A.)

Thesis option only: 36 credits

The M.F.A. degree program requires 36 credit hours of graduate work. The program balances courses in literature with writing workshops (30 hours), and requires a creative thesis (six hours). It offers concentrations in fiction and in poetry.

Course	Title	Credits
Core Requirements		
Poetry or Fiction concentration must complete the following:		

ENGL688	Poetry Workshop	12
Four English Literature Courses		12
Humanities elective		3
ENGL799	Master's Thesis Research	6
Concentration Options		
Select one of the following:		3
Poetry concentration:		
ENGL788	Studies in Poetic Form	
Fiction concentration:		
ENGL789	Form and Theory in Fiction	
Total Credits		**36**

Creative Writing (CRWR)

Graduate Degree Program
College: Arts and Humanities

Abstract

The MFA in Creative Writing provides a professional course of study for graduate students seeking to perfect their ability to compose poems, stories, and novels. While primarily affording students intensive studio or practical work within their chosen genre, the MFA in Creative Writing requires that students incorporate such work with a traditional study of literature. The goal of the MFA in Creative Writing is to provide an atmosphere in which students can both hone their skills as writers and gain a theoretical and historical understanding of their craft.

The Department of English also offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees in English Language and Literature (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?ENGL). Please visit the English Language and Literature (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?ENGL) listing for more information.

Financial Assistance

Each year, the program accepts 8 applicants (4 fiction writers and 4 poets), who are fully funded by Teaching Assistantships, and, this current admissions cycle, we were able to enhance all 8 Teaching Assistantships with additional fellowship support. Our aid packages are typically 2-year agreements. As Teaching Assistants, our MFA students teach one class during their first year (in the spring semester) and three classes during their second year. Although a great deal of this teaching is Academic Writing (English 101), our MFA students are guaranteed at least one chance to teach an undergraduate creative writing workshop or to serve as a teaching assistant in an undergraduate literature course.

Contact

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Joshua Weiner
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Creative Writing Program
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University of Maryland
College Park, MD 20742
Telephone: 301.405.3789
Email: jweiner1@umd.edu

Website: http://www.english.umd.edu/academics/creativewriting **(**http://www.english.umd.edu/academics/creativewriting/**)**

Courses: ENGL (https://umd-curr.courseleaf.com/graduate/courses/engl/)

Relationships: English Language and Literature (ENGL) (p. 182)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume (optional)
- Description of Research/Work Experience (optional)
- Writing Sample

In addition to fulfilling Graduate School requirements, applicants to the M.F.A. degree program should present a 3.0 GPA. Admission is for the Fall semester only. All application materials must be submitted electronically.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 15, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 15, 2021

RESOURCES AND LINKS:
Program Website: http://www.english.umd.edu/academics/creativewriting (http://www.english.umd.edu/academics/creativewriting/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Creative Writing, Master of Fine Arts (M.F.A.) (p. 145)

Facilities and Special Resources

Resources for research in the College Park and Washington, D.C. area are unsurpassed. The university's libraries hold over 2,000,000 volumes. In addition to the outstanding holdings of the Library of Congress, the area also offers the specialized resources of the Folger Shakespeare Library, Dumbarton Oaks, the National Archives, the Smithsonian Institution, and the National Center for the Study of the Visual Arts. The university recently partnered with the Phillips Collection to create the University of Maryland Center for Art and Knowledge, a dynamic collaboration that includes new curriculum, experimental and community-focused education programs, a new Phillips Collection gallery and an open storage facility in College Park.

UMCP is a member of the Consortium of Institutions in the Washington area, which permits graduate students at College Park to enroll in courses at other universities for graduate credit at UMCP. Graduate students in English also may take courses for graduate credit at the Folger Institute of Renaissance and Eighteenth-Century Studies, which runs a series of seminars by distinguished scholars each year.

Criminology and Criminal Justice, Master of Arts (M.A.)

Non-thesis only: 30 credits required

*Please note, part of the coursework is completed in China

Course	Title	Credits
Core Requirements		
CCJS600	Criminal Justice	3
CCJS604	Policy Analysis Project	3
CCJS605	Program Evaluation for Criminal Justice	3
CCJS611	Statistical Tools for Criminal Justice	3
CCJS651	Seminar in Criminology	3
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678D - International Law and Process)	3
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678E - Criminal Procedure Law)	3
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678F - Criminal Law)	3
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678G - Criminal Justice System in China)	3
CCJS720	Criminal Justice System Planning: Policy Analysis for Crime Control	3
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678K - Research Methods non credit)	0
CCJS678	Advanced Topics in Criminology and Criminal Justice (CCJS678L - Chinese Criminal Law and Criminal Justice non credit)	0
Total Credits		**30**

Criminology and Criminal Justice (CJCH)

Graduate Degree Program

College: Behavioral and Social Sciences

Abstract

Students complete the first part of their coursework at Nanjing Normal University in China and the second part at the University of Maryland. Please visit the websites listed below for more information.

Contact

Office of International and Executive Programs (OIEP)
1117L Chincoteague Hall
7401 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3356
Email: mdravis@umd.edu ; mxli@umd.edu

Websites: https://ccjs.umd.edu/graduate/professional-masters-nanjing-china (https://ccjs.umd.edu/graduate/professional-masters-nanjing-china/) ; https://oiep.umd.edu/landingtopic/joint-cj-program-nanjing-normal-university (https://oiep.umd.edu/landingtopic/joint-cj-program-nanjing-normal-university/)

Relationships: Criminology and Criminal Justice (CRIM) (p. 148), Justice Leadership (MPJL) (p. 264)

Courses: CCJS (https://umd-curr.courseleaf.com/graduate/courses/ccjs/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)
- Notarized degree certificate
- Transcripts in English and Chinese

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	This is a cohort-based program. Please contact the department for application information.
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	This is a cohort-based program. Please contact the department for application information.

RESOURCES AND LINKS:
Program Website: www.ccjs.umd.edu/landing/Graduate (http://www.ccjs.umd.edu/landing/Graduate/)
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Criminology and Criminal Justice, Master of Arts (M.A.) (p. 147)

Criminology and Criminal Justice, Master of Arts (M.A.)

Thesis only: 30 credits required

For the M.A. applicant, the undergraduate major must have included at least one course each in theory, statistics and research methods. The general plan of study for the Traditional M.A. is as follows: 30 semester hours of courses consisting of:

1. five required courses that must be passed with a 'B' or better (including two statistics courses);
2. six hours of thesis credit; and
3. three elective courses

Course	Title	Credits
Core Requirements		
CCJS600	Criminal Justice	3
CCJS610	Research Methods in Criminal Justice and Criminology	3
CCJS620	Fundamentals of Criminological Research	3
CCJS621	General Linear Models in Criminal Justice Research	3
CCJS651	Seminar in Criminology	3
CCJS799	Master's Thesis Research	6
Electives		9
Total Credits		**30**

Criminology and Criminal Justice, Doctor of Philosophy (Ph.D.)

Description of coursework: Doctoral students who enter the program with a B.A. or B.S. must complete the master's requirements in addition to the doctoral level requirements. Students who enter with a M.S. or M.A. are required to complete only the doctoral level requirements.

Students whose highest degree is a BA/BS may choose to apply for entry either into the Traditional Masters program or directly into the Ph.D. program. Students admitted directly into the Ph.D. program will complete the requirements of the Traditional Masters program before beginning Ph.D.-level work.

In addition to the general Graduate School requirements, competence in research methodology and in quantitative techniques is expected for the completion of the Ph.D. degree, as well as competence in theory and the criminal justice field. The necessary coursework is determined on the basis of the student's previous preparation, needs and interests.

Advance to Candidacy: In addition to the course requirements, students are required to pass a Qualifying Exam and a clinical assessment before advancing to candidacy.

Post-Candidacy: Students must complete at least 12 credits of 899 Doctoral Dissertation Research and successfully defend and submit a doctoral dissertation.

Course	Title	Credits
Core Requirements		
CCJS699	Special Criminological Problems (Research Practicum)	3
CCJS654	History of Criminological Thought	3
CCJS700	Advanced Research Methods in Criminology and Criminal Justice	3
CCJS710	Advanced Statistics Methods - Limited Dependent Variables	3
CCJS720	Criminal Justice System Planning: Policy Analysis for Crime Control	3
Electives, one of which taken outside of department		15
Advanced Statistics course		3
Dissertation Requirements		
CCJS899	Doctoral Dissertation Research	12
Total Credits		**45**

Criminology and Criminal Justice (CRIM)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The program of graduate study leading to a Traditional Master of Arts and Doctorate of Philosophy degrees in the area of Criminology and Criminal Justice is intended to prepare students for research, teaching and professional employment in operational agencies within the field of criminal justice. This program combines an intensive background in a social science discipline such as criminology, criminal justice, sociology, psychology and public policy with graduate-level study of selected aspects of crime and criminal justice.

In addition, the Department offers a joint J.D./M.A. degree with the University of Maryland Francis King Carey School of Law, located in Baltimore.

A recent study of Department M.A. and Ph.D. alumni reveals that master's degree graduates have found employment in both public and private institutions in virtually every kind of activity associated with the criminal justice system: research; teaching; federal, state and local law enforcement; courts; corrections; private security; and funded programs. Ph.D. graduates have found employment mostly in teaching, research, and government agency administration.

Financial Assistance

Graduate research assistantships, teaching assistantships, scholarships, and fellowships are available to select individuals applying to our doctoral program. In recent years many admitted doctoral students receive funding through assistantships, and some may be awarded supplemental scholarships or fellowships offered by the Department, the BSOS Dean's Office, or The Graduate School. Applications should be received by December 1st of the preceding Fall term for best consideration.

If you're interested in applying for the Fellowships in Support of Diversity and Inclusion (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdfellowshipsinsupportofdiversityinbsos.pdf) in the Behavioral

and Social Sciences, please be sure to upload your materials under "Supplementary Application" when submitting your online admissions application.

Contact

Graduate Program Coordinator
Department of Criminology
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7251 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6838
Email: criminologydept@umd.edu

Website: https://ccjs.umd.edu/landing/Graduate **(**https://ccjs.umd.edu/landing/Graduate/**)**

Courses: CCJS (https://umd-curr.courseleaf.com/graduate/courses/ccjs/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample
- Description of Research/Work Experience (optional)

In addition to the general Graduate School rules, special admission requirements include a major in a social science discipline and nine hours of coursework in appropriate areas of criminal justice.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 17, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 17, 2021

RESOURCES AND LINKS:

Program Website: https://ccjs.umd.edu/landing/Graduate (https://ccjs.umd.edu/landing/Graduate/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Criminology and Criminal Justice, Doctor of Philosophy (Ph.D.) (p. 148)
- Criminology and Criminal Justice, Master of Arts (M.A.) (p. 148)

Facilities and Special Resources

The Department has various opportunities for graduate students to participate in current projects. Recent students have worked in research centers at the Maryland State Commission on Criminal Sentencing Policy, National Consortium for the Study of Terrorism and Responses to Terrorism (START), and the National Institute of Justice. In addition, our faculty maintain an array of ongoing, funded research projects where students can assist. These resources provide numerous opportunities for students to engage in policy development, research, and professional activities.

Critical Theory, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Course	Title	Credits
Core Requirements		
Introductory course in critical theory		3
Two certificate courses		6
Two theory courses		6
Colloquium in Critical Theory		3
Present theoretically-inflected work at a session of the theory colloquium		
Total Credits		**18**

Critical Theory (Z017)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The Graduate Certificate in Critical Theory is an integrated curriculum offering students the opportunity to gain advanced knowledge, expertise, and certification in the interdisciplinary and international field of critical theory. Students enrolled for the M.A. or Ph.D. degree within any department at the University of Maryland at College Park may apply to participate. The Certificate is presently administered through the Department of English and the Program Coordinator is Professor Christina Walter.

CONTACT

Christina Walter
Department of English
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7751 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7689
Email: cmwalter@umd.edu

Website: http://www.english.umd.edu

Courses: ENGL (https://umd-curr.courseleaf.com/graduate/courses/engl/)

Admissions

Please contact Professor Christina Walter (cmwalter@umd.edu) for admissions information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.english.umd.edu

Requirements

- Critical Theory, Post-Baccalaureate Certificate (P.B.C.) (p. 149)

Cultural and Heritage Resource Management, Master of Professional Studies (M.P.S.)

Thesis option only: 36 credits required

Course	Title	Credits
Required courses:		36
ANTH741	Introduction to Cultural and Heritage Resource Management	
ANTH742	Advanced Methods in CRM	
ANTH743	Community Engagement and Consultation	
ANTH744	Collections, Data Management and Cultural Materials Preservation	
ANTH745	International Heritage Management (International Heritage Management)	
ANTH746	Applied Archaeological Theory (Applied Archaeological Theory)	
ANTH747	Business of CRM (Business of CRM)	
ANTH748	Project Management (Project Management)	
ANTH749	Cultural and Heritage Resource Management Internship (Cultural and Heritage Resource Management Internship)	
Thesis research and project		

Cultural and Heritage Resource Management (online) (MPCH)

Graduate Degree Program
College: Behavioral and Social Sciences

abstract

The online Master of Professional Studies in Cultural and Heritage Resource Management provides advanced training for those interested in working in the applied specialization of cultural resource management and heritage resource management. The coursework and training bridge the knowledge and experience gap between what is offered in a traditional academic course of study and the knowledge and skills required in cultural and heritage resource management. The program is built on a broad foundation including research methods, ethics, communication, management, technical writing, and critical thinking skills.

CONTACT

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Website: https://anth.umd.edu/

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose, including research interests
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (2)
- Graduate Record Examination (GRE) (optional)
- Writing Sample
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	January 28, 2022
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	January 28, 2022

RESOURCES AND LINKS:
Program Website: https://oes.umd.edu (https://oes.umd.edu/)
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Cultural and Heritage Resource Management, Master of Professional Studies (M.P.S.) (p. 150)

Cultural and Heritage Resource Management, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
ANTH741	Introduction to Cultural and Heritage Resource Management	3
Electives (choose three courses from the following):		**9**
ANTH742	Advanced Methods in CRM	
ANTH743	Community Engagement and Consultation	
ANTH744	Collections, Data Management and Cultural Materials Preservation	
ANTH745	International Heritage Management	
ANTH746	Applied Archaeological Theory	
ANTH747	Business of CRM	
ANTH748	Project Management	
Total Credits		**12**

Cultural and Heritage Resource Management (Z121)

Graduate Certificate Program
College: Behavioral and Social Sciences

abstract

The online Graduate Certificate in Cultural and Heritage Resource Management will emphasize professional development, ethics, and writing as well as professional communication, critical thinking, and career options.

contact

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Email: nadine@umd.edu

Website: https://anth.umd.edu/

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose, including research interests
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (2)
- Graduate Record Examination (GRE) (optional)
- Writing Sample
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	January 28, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	January 28, 2022

RESOURCES AND LINKS:
Program Website: https://oes.umd.edu (https://oes.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Cultural and Heritage Resource Management, Post-Baccalaureate Certificate (P.B.C.) (p. 151)

Curation and Management of Digital Assets, Post-Masters Certificate (P.M.C.)

12 credits required

The Curation and Management of Digital Assets (CMDA) Certificate is a post-master's program that focuses on instruction about and research

into the creation, management, and use; the long-term preservation; and the current and future access to digital assets in a variety of disciplines and sectors of the economy. It is a four-course, fully online certificate designed for working professionals who need training in next-generation cloud computing technologies, tools, and resources to help them evaluate, select, and implement digital curation solutions.

The CMDA Certificate requires the completion of four courses, with a minimum 3.0 GPA. The following courses are taken in sequence within one calendar year.

Course	Title	Credits
Core Requirements		
INST640	Principles of Digital Curation	3
INST641	Policy and Ethics in Digital Curation	3
INST742	Implementing Digital Curation	3
INST744	Solving Problems in Digital Curation - Capstone Course	3
Total Credits		**12**

Curation and Management of Digital Assets (online) (Z093)

Graduate Certificate Program
College: Information Studies

Abstract

The Curation and Management of Digital Assets (CMDA) Certificate is a post-master's program that focuses on instruction about and research into the creation, management, and use of digital assets, and the long-term preservation and current and future access to those assets in a variety of disciplines and sectors of the economy. This four-course, fully online certificate designed for working professionals who need training in next-generation cloud computing technologies, tools, resources, and best practices to help them evaluate, select, and implement digital curation solutions.

In the Washington, D.C.-Maryland-Virginia region, across the nation, and around the world, the need for professionals to manage and curate digital assets is acute. Major corporations, government agencies, international organizations, universities, cultural heritage institutions, and scientific organizations need information professionals with the knowledge, skills, and abilities to manage, preserve, and curate digital resources.

Website: https://ischool.umd.edu/

Contact

Student Services Office
College of Information Studies
4120 Hornbake Library, South Wing
4130 Campus Drive
College Park, MD 20742
Telephone: 301.405.2038
Fax: 301.405.9145
Email: ischooladmission@umd.edu

Courses: INST (p. 867)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (1): Letter of recommendation needs to come from a supervisor or someone who can speak to the applicant's capacity for successfully completing the certificate program.
- CV/Resume
- Master's degree in library/information science; or Master's degree in related area/relevant experience

Application Submission Requirements for International Graduate Students

The University of Maryland is dedicated to maintaining a vibrant international graduate student community. The office of International Students and Scholars Services (ISSS) is a valuable resource of information and assistance for prospective and current international students. International applicants are encouraged to explore the services they offer and contact them with related questions. Please also visit the Graduate Admissions Process for International applicants for more information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Not accepting applications	Not accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Not accepting applications	Not accepting applications

RESOURCES AND LINKS:
Program Website: http://www.ischool.umd.edu
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Curation and Management of Digital Assets, Post-Masters Certificate (P.M.C.) (p. 151)

Facilities and Special Resources

The Digital Curation Innovation Center(DCIC) is a leader in research and education in digital curation. The Center fosters interdiciplinary partnerships in Big Records and archival analytics through public / industry / government partnerships. DCIC sponsors interdisciplinary projects that explore the integration of archival research data, user-contributed data, and technology to generate new forms of analysis and

historical research. For more information, visit dcic.umd.edu (http://dcic.umd.edu).

Curriculum and Instruction, Master of Education (M.Ed.)

Students have the option of pursuing certification or non-certification tracks.

Beyond the successful completion of courses, students must demonstrate high standards of scholarship and the ability to engage in independent research. Students must either write and defend a research thesis, complete a seminar paper (non-thesis option) or a professional portfolio--requirement varies by specialization. Your faculty advisor will help you develop a program of study that is consistent with Departmental and University guidelines.

Certification options

1. Elementary: 36 credits required
2. Middle School: 38 credits required
3. Secondary English: 36 credits required
4. Secondary Social Studies: 36 credits required
5. Secondary Mathematics: 36 credits required
6. Secondary Sciences: 36 credits required
7. PreK-12 Art: 36 credits required
8. PreK-12 World Languages: 36 credits required
9. PreK-12 Teaching English to Speakers of Other Languages (TESOL): 39 credits required
10. PreK-12 Physical Education: 42 credits required
11. PreK-12 Dance: 42 credits required
12. TESOL with K-12 Certification (on-campus): 39 credits
13. Reading Education with Reading Specialist certification: 30 credits required
14. World Languages: 36 credits required
15. Creative Initiatives in Teacher Education: 37 credits required
16. Secondary Computer Science: 42 credits required

non-certification options

All of the non-certification tracks require 30 credits.

1. Art Education
2. Arts Integration
3. Elementary-Middle School
4. English Literacy Education
5. Mathematics Education
6. Minority and Urban Education
7. Reading Education
8. Science Education
9. Social Studies Education
10. STEM Elementary
11. World Languages Education
12. TESOL Teacher Leadership

Curriculum and Instruction (EDCI)

Graduate Degree Program
College: Education

Abstract

The Curriculum and Instruction (EDCI) program, housed within the Department of Teaching and Learning, Policy and Leadership, offers graduate study leading to the Master of Education (**M.Ed.**). The Department offers a variety of programs individually designed to meet graduate students' personal and professional goals which may include educational research, teaching, supervising, providing leadership as curriculum specialists within the disciplines, teacher education or consulting at all levels of instruction: elementary, secondary and higher education. Some of the M.Ed. concentrations lead to teacher certification, including concentrations for candidates who have a bachelor's degree in fields other than education and wish to become certified teachers (https://education.umd.edu/academics/departments/tlpl/prospective-students/). Other options include "stand-alone" M.Ed. concentrations intended for teachers and other education professionals. We also offer masters programs intended for education professionals whose work centers around research, as M.A. in the Teaching & Learning, Policy & Leadership program (TLPL).

For a complete list of current programs and specializations, please see the TLPL master's program listings (https://education.umd.edu/academics/programs/graduate/masters/?department=25894).

NOTE: Students interested in the M.Ed. (as opposed to the M.A.) programs should apply to EDCI, even though the Department of Teaching and Learning, Policy and Leadership (TLPL) now sponsors these programs. Students interested in a master of arts (M.A.) degree should visit Education: Teaching and Learning, Policy and Leadership (EDTL) in the graduate catalog. Students interested in the Department's Ph.D. program should go to Teaching and Learning, Policy and Leadership (TLPL) in the graduate catalog.

Financial Assistance

A variety of sources are available for seeking financial assistance in the way of graduate assistantships, scholarships, fellowships and financial aid loans. For more information visit https://education.umd.edu/admissions/funding-scholarships (https://education.umd.edu/admissions/funding-scholarships/).

Contact

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Email: tlpl-admissions@umd.edu

Website: https://education.umd.edu/academics/departments/tlpl/prospective-students **(**https://education.umd.edu/academics/departments/tlpl/prospective-students/**)**

Courses: TLPL **(**https://umd-curr.courseleaf.com/graduate/courses/tlpl/**)** (Former Courses EDCI EDPS)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- M.Ed. (non-certification) admissions requirements (https://gradschool.umd.edu/education/edci-med/)
- M.Ed. (with certification) admissions requirements (https://gradschool.umd.edu/education/edci-med-cert/)

Some programs offer fall or summer only admissions. For more information on our M.Ed. and M.Ed with Certification programs, view the TLPL and EDCI Chart (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/tlpledcichart.pdf).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	March 1, 2022	December 10, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	March 1, 2022	September 30, 2021

RESOURCES AND LINKS:

Program Website: http://www.education.umd.edu/tlpl (http://www.education.umd.edu/tlpl/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Art Education, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/art-education-noncert-med/)
- Arts Integration, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/arts-integration-noncert-med/)
- Creative Initiatives in Teacher Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/cite-cert-med/)
- Elementary Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/elementary-cert-med/)
- Elementary-Middle School Education, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/elementary-middle-school-noncert-med/)
- English Literacy Education, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/english-literacy-education-noncert-med/)
- Mathematics Education, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/mathematics-education-noncert-med/)
- Middle School Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/middle-school-cert-med/)
- Middle School Mathematics Education, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/middle-school-mathematics-education-noncert-med/)
- Minority and Urban Education, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/minority-urban-education-noncert-med/)
- PreK-12 Art Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/prek12-art-cert-med/)
- PreK-12 Dance Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/prek12-dance-cert-med/)
- PreK-12 Physical Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/prek12-physical-education-cert-med/)
- PreK-12 Teaching English to Speakers of Other Languages, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/prek12-tesol-cert-med/)
- PreK-12 World Languages, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/prek12-world-languages-cert-med/)
- Reading Education & Reading Specialist, Master of Education, (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/reading-specialist-cert-med/)
- Reading Education, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/reading-education-noncert-med/)
- Science Education, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/science-education-noncert-med/)
- Secondary Computer Science Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/secondary-computer-science-cert-med/)
- Secondary English Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/secondary-english-cert-med/)
- Secondary Mathematics Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/secondary-mathematics-cert-med/)
- Secondary Sciences Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/secondary-sciences-cert-med/)
- Secondary Social Studies Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/secondary-social-studies-cert-med/)
- Social Studies Education, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/social-studies-education-noncert-med/)
- STEM Elementary Education, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/stem-elementary-noncert-med/)
- TESOL Teacher Leadership, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/tesol-teacher-leadership-noncert-med/)
- World Languages Education, Master of Education (certification, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/world-languages-cert-med/)

- World Languages Education, Master of Education (M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/curriculum-instruction-edci/world-languages-education-noncert-med/)

Facilities and Special Resources

Faculty and students in the department work closely with area schools, colleges, universities, associations and other education-related organizations. Extensive resources in the Washington, D.C., area, including embassies and other international organizations, provide exceptional opportunities for internships and field experiences, research, and materials to enhance formal course experiences. Facilities that support graduate study include the Center for Mathematics Education, the Center for Science and Technology in Education, the Multicultural Research Center, and the Maryland Equity Project. Additional facilities in the College of Education include the Educational Technology Services Center and numerous Professional Development Schools in local school districts.

Curriculum and Instruction, Certificate of Advanced Study (C.A.S.)

This certificate is not currently accepting applications.

Curriculum and Instruction (Z902)

Graduate Certificate Program
College: Education

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.education.umd.edu

Admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Curriculum and Instruction, Certificate of Advanced Study (C.A.S.) (p. 155)

Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements		
Select four of the following:		12
ENPM686	Information Assurance	
ENPM691	Hacking of C programs and Unix Binaries	
ENPM693	Network Security	
ENPM695	Secure Operating Systems	
ENPM694	Networks and Protocols	
ENPM685	Security Tools for Information Security	
Total Credits		**12**

Cybersecurity Engineering (online) (Z092)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered in collaboration with Department of Electrical and Computer Engineering, Department of Computer Science, and the Maryland Cybersecurity Center, our Cybersecurity Engineering degree programs merge engineering applications with computer science principles.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Telephone: 301.405.7712
Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENPM (https://umd-curr.courseleaf.com/graduate/courses/enpm/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:

Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 155)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Cybersecurity Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits

The student must complete 30 credits of approved coursework with an average grade of B. The coursework, which allows up to 12 credits at the 400-level, must be approved by the program's departmental faculty advisor.

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required course:		3
ENPM691	Hacking of C programs and Unix Binaries (Programming in C for Cybersecurity Applications)	
Choose three of the following core courses:		9
ENPM685	Security Tools for Information Security	
ENPM686	Information Assurance	
ENPM693	Network Security	
ENPM694	Networks and Protocols	
ENPM695	Secure Operating Systems	
Choose at least two of the following electives:		6
ENPM687	Digital Forensics and Incidence Responses	
ENPM697	Secure Software Testing and Construction	
ENPM809	Special Topics in Engineering (ENPM809A - Applied Cryptography)	
ENPM809	Special Topics in Engineering (ENPM809I - Embedded Systems Hacking and Security)	
ENPM809	Special Topics in Engineering (ENPM809J - Cloud Security)	
ENPM809	Special Topics in Engineering (ENPM809K - Fundamentals for Artificial Intelligence and Deep Learning Framework)	
ENPM809	Special Topics in Engineering (ENPM809V - Bitcoin and Cryptocurrency Technologies)	
ENPM808	Advanced Topics in Engineering (ENPM808O - Intrusion Detection: From Theory to Practice)	
Remainder of electives chosen with advisor		12
Total Credits		**30**

Cybersecurity Engineering (PMCY)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers

and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered in collaboration with Department of Electrical and Computer Engineering, Department of Computer Science, and the Maryland Cybersecurity Center, our Cybersecurity Engineering degree programs merge engineering applications with computer science principles.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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University of Maryland
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Telephone: 301.405.7712
Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENPM (https://umd-curr.courseleaf.com/graduate/courses/enpm/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:
Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Cybersecurity Engineering, Master of Engineering (M.Eng.) (p. 156)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Cybersecurity (MECY) for more information.

Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements		
Select four of the following:		12

ENPM686	Information Assurance	
ENPM691	Hacking of C programs and Unix Binaries	
ENPM693	Network Security	
ENPM695	Secure Operating Systems	
ENPM694	Networks and Protocols	
ENPM685	Security Tools for Information Security	
Total Credits		**12**

Cybersecurity Engineering (Z073)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered in collaboration with Department of Electrical and Computer Engineering, Department of Computer Science, and the Maryland Cybersecurity Center, our Cybersecurity Engineering degree programs merge engineering applications with computer science principles.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENPM **(**https://umd-curr.courseleaf.com/graduate/courses/enpm/**)**

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 157)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Cybersecurity (Z092) for more information.

Cybersecurity Leadership, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Cybersecurity Leadership (Z077)

THIS PROGRAM IS NOT CURRENTLY ACCEPTING APPLICATIONS. PLEASE VISIT THE DEPARTMENT WEBSITE FOR A LISTING OF PROGRAMS CURRENTLY BEING OFFERED. THE DEPARTMENT WEBSITE IS WWW.RHSMITH.UMD.EDU (http://www.rhsmith.umd.edu/)

Graduate Certificate Program
College: Business

Admissions

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Program not currently accepting applications
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.rhsmith.umd.edu

Requirements

- Cybersecurity Leadership, Post-Baccalaureate Certificate (P.B.C.) (p. 159)

Cybersecurity Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

The student must complete 30 credits of approved coursework with an average grade of B. The coursework, which allows up to 12 credits at the 400-level, must be approved by the program's departmental faculty advisor.

Course	Title	Credits
Required course:		3
ENPM691	Hacking of C programs and Unix Binaries (Programming in C for Cybersecurity Applications)	
Choose three of the following core courses:		9
ENPM685	Security Tools for Information Security	
ENPM686	Information Assurance	
ENPM693	Network Security	
ENPM694	Networks and Protocols	
ENPM695	Secure Operating Systems	
Choose at least two of the following electives:		6
ENPM687	Digital Forensics and Incidence Responses	
ENPM697	Secure Software Testing and Construction	
ENPM809	Special Topics in Engineering (ENPM809A - Applied Cryptography)	
ENPM809	Special Topics in Engineering (ENPM809I - Embedded Systems Hacking and Security)	
ENPM809	Special Topics in Engineering (ENPM809J - Cloud Security)	
ENPM809	Special Topics in Engineering (ENPM809K - Fundamentals for Artificial Intelligence and Deep Learning Framework)	
ENPM809	Special Topics in Engineering (ENPM809V - Bitcoin and Cryptocurrency Technologies)	
ENPM808	Advanced Topics in Engineering (ENPM808O - Intrusion Detection: From Theory to Practice)	
Remainder of electives chosen with advisor		12
Total Credits		**30**

Cybersecurity Engineering (online) (MECY)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered in collaboration with Department of Electrical and Computer Engineering, Department of Computer Science, and the Maryland Cybersecurity Center, our Cybersecurity Engineering degree programs merge engineering applications with computer science principles.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Telephone: 301.405.7712
Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENPM (https://umd-curr.courseleaf.com/graduate/courses/enpm/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus/).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/application-process (https://mage.umd.edu/application-process/)
Program Website: mage.umd.edu (https://mage.umd.edu/)

Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Cybersecurity Engineering, Master of Engineering (M.Eng.) (p. 159)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Dance, Master of Fine Arts (M.F.A.)

Thesis only: 60 credits required

Students enrolled in the program must complete a total of 60 credit hours of study with a minimum cumulative grade point average of 3.0 to graduate and will be assessed on a regular basis to determine their progress. Graduation from the program requires the successful completion of a final project demonstrating a synthesis of craft and artistic understanding as well as professional competence in the area of concentration. Final projects consist of:

1. the thesis project consisting of the public presentation of a dance work choreographed by the candidate, along with written documentation of the project as agreed upon with the thesis adviser;
2. the presentation of an online portfolio of selected indicators of artistry and pedagogy.

The thesis project work may be presented in one or more publicly attended events, in a shared capacity with another MFA candidate. Candidates are responsible for the organization of all production elements involved in the presentation of the project.

The following courses are required. Students should check with their advisor to determine the remainder of their coursework.

Course	Title	Credits
Core Requirements		
DANC600	Graduate Dance Research	3
DANC604	Graduate Studies in Dance Pedagogy	3
DANC608	Graduate Choreography I: Creative Process	3
DANC610	Workshop in the Direction of Dance Production	1
DANC611	Dance Technology and Media	1
DANC648	Advanced Modern Dance Technique I	1
DANC649	Advanced Modern Dance Technique II	1
DANC699	Thesis Writing Lab	1
DANC708	Graduate Choreography II: Collaboration	3
DANC719	Graduate Choreography III: Projects	3
DANC766	Graduate Movement Observation and Analysis	3
DANC784	Dance in a Global Context	3
DANC799	Master's Thesis Project	6

TDPS789	Professional Development in Dance and Theatre	1
Electives approved with advisor		27
Total Credits		**60**

Dance (DANC)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Theatre, Dance, and Performance Studies offers a Master of Fine Arts degree in Dance, encompassing choreography, performance, dance and technology, scholarly research, and pedagogy. Emphasizing creative work and collaboration with TDPS MFA candidates in Lighting, Set, Costume and Media/Projection Design, the program is grounded in rigorous academic study and offers a transformational education to those who are curious, motivated, self-directed and possess a spirit of expansive inquiry and innovation. The program is designed to give outstanding students advanced training, experience in teaching, and opportunities for creative growth. For more information visit the MFA in Dance website at http://tdps.umd.edu/programs/mfa-dance (http://tdps.umd.edu/programs/mfa-dance/) or the School website at http://tdps.umd.edu.

Aimed primarily at modern or contemporary dancers with a high skill level and background in creating and performing at a professional level, opportunities abound in the creation of cross-disciplinary projects, presenting choreography in formal and informal settings throughout the three years, performing in guest artist and faculty works, presenting academic work at conferences and symposia, and participating in community-based performance and scholarly events.

The degree culminates with a thesis: an original choreographed and performed creative project and a written thesis. The third year also includes an off-campus internship with a professional arts organization, research venue, agency, company, or school.

The competencies that students learn during the program will allow them to teach a broad range of dance and dance-related subjects after they graduate. They will be able to produce and present dance in a number of contexts and modalities, on campus, in professional and site-specific venues, and in the community.

We wish our graduates to exhibit a high degree of insight into the cultural contexts in which dance has developed in the past and continues to develop today.
Students are expected to spend a significant amount of time learning about technical aspects of dance as well as promotion and house management and the myriad of other organizational details that go into producing a dance performance. They will be actively involved in the practical application of this knowledge as part of their training.

The program is highly selective (four students per year) and auditions are required. The MFA is a full-time three-year program. Financial support is available for each student selected.

Financial Assistance

Four candidates are admitted each Fall, and each of the four are offered financial support through teaching assistantship appointments, or if available, fellowships. Assistantships are never guaranteed and funding can change year to year. All qualified applicants may be nominated for Graduate School fellowships; the deadline for all applications is posted on the TPDS website annually. For more information, visit http://tdps.umd.edu or call 301-405-6694.

Contact

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Website: http://tdps.umd.edu/programs/mfa-dance **(**http://tdps.umd.edu/programs/mfa-dance/**)**

Courses: DANC **(**https://umd-curr.courseleaf.com/graduate/courses/danc/**)**

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample
- Sample of Work: A 10-15 minute video, providing example of applicant's choreography with a description to include name of the work, performers and other choreographers, either on the applicant's professional website or through a Vimeo/YouTube link entered into the Multimedia Requirements section of the application

Applicants should have a strong undergraduate preparation in technique and dance composition. They should have completed the following undergraduate courses or their equivalent: improvisation, kinesiology, dance teaching methods, dance production, Laban Movement Analysis, and two semesters of dance history or one semester of history and one of dance philosophy, ethnology or aesthetics. Undergraduate deficiencies will be considered on an individual basis.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	February 18, 2022	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	February 18, 2022	N/A

RESOURCES AND LINKS:
Program Website: http://tdps.umd.edu/programs/mfa-dance (http://tdps.umd.edu/programs/mfa-dance/)
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Dance, Master of Fine Arts (M.F.A.) (p. 160)

Facilities and Special Resources

The location of the campus, eight miles away from Washington D.C., places the School a half hour away from America's arts district where one may study and enjoy a wide variety of offerings of ballet, modern and broad variety of dance forms. Washington D.C. is also a center for policy and participation in the public discourse about the arts.

Data Science, Post-Baccalaureate Certificate (P.B.C.)

Course	Title	Credits
Core Requirements		
DATA601	Probability and Statistics	3
DATA602	Principles of Data Science	3
DATA604	Data Representation and Modeling	3
Electives (choose 3 credits from following options):		**3**
DATA603	Principles of Machine Learning	
DATA605	Big Data Systems	
DATA606	Algorithms for Data Science	
Total Credits		**12**

Data Science (Z104)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Graduate Certificate in Data Science provides a broad introduction to the field—including how to extract and clean data, store and manage large volumes of data, and analyze such data and extract insights from it. The program involves interdisciplinary activities that create data-centered products, applications or programs that help to answer scientific, socio-political or business questions. It requires the ability to integrate data, operate on data at scale, and analyze data to make predictions, find patterns and form and test hypothesis. Practices from a variety of fields are incorporated, including in computer science disciplines such as Machine Learning, Statistics, Databases, and Visualization.

This is a 12-credit graduate program designed to accommodate working professionals while minimally disrupting personal and professional life. Instruction is provided by UMD faculty and experts in the field. The program features face-to-face instructional delivery; classes meet at the UMD College Park campus (https://maps.umd.edu/map/).

Financial Assistance

See: http://oes.umd.edu/professional-programs/data-science/data-fees-aid (http://oes.umd.edu/professional-programs/data-science/data-fees-aid/) for information about fees, payment plans, and financial aid.

Contact

Science Academy
University of Maryland
College Park, MD 20742
Telephone: 301.405.9101
Email: scienceacademy@umd.edu

Website: https://scienceacademy.umd.edu/datascience/certificate (https://scienceacademy.umd.edu/datascience/certificate/)

Courses: DATA

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students) (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/)

Program-Specific Requirements

- Letters of Recommendation (optional)
- CV/Resume
- Description of Research/Work Experience
- Prior coursework: Prior coursework establishing quantitative ability (i.e. calculus, linear algebra, basic statistics etc.).
- Proficiency in programming languages: Proficiency in programming languages, demonstrated either through prior programming coursework or substantial software development experience.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	June 30, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	N/A

RESOURCES AND LINKS:
Program Website: https://scienceacademy.umd.edu/datascience/certificate (https://scienceacademy.umd.edu/datascience/certificate/)
Application Process: gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Requirements

- Data Science, Post-Baccalaureate Certificate (P.B.C.) (p. 162)

Digital Studies, Post-Baccalaureate Certificate (P.B.C.)

15 credits required

Course	Title	Credits
Core Requirements		
MITH610	Introduction to Digital Studies in the Arts and Humanities	3
Praxis course approved with advisor		3
MITH729	Colloquium in Digital Studies	3
Electives approved with advisor		6
Total Credits		**15**

Digital Studies (Z110)

Graduate Certificate Program
College: Arts and Humanities

Abstract

Digital Studies in the Arts and Humanities (DSAH) is an interdisciplinary Graduate Certificate at the University of Maryland.

It offers graduate students a chance to combine the critical study of new forms of digital media and identity with creative and analytical practices utilizing digital media as well as the application of computational tools and techniques to traditional areas of humanistic study. While it is often hands-on or applied, Digital Studies also encourages—indeed demands—work that is primarily critical, theoretical, or experimental in nature.

Broadly speaking then, Digital Studies is a critical, scholarly, and creative response to the widespread influence of digital media across nearly every aspect of contemporary life; more specifically, it recognizes that teaching, research, and scholarship in the arts and humanities cannot remain isolated from the networks, platforms, and new media all around us. Scholars and practitioners of the arts and humanities should play an active critical and creative role in shaping both reception and development of digital media, both in our disciplines and in society at large.

Contact

Matthew Kirschenbaum
Professor
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7751 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.9650
Email: mgk@umd.edu

Website: http://dsah.umd.edu

Courses: MITH (https://umd-curr.courseleaf.com/graduate/courses/mith/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume

Application for admission to the Certificate is currently available on a rolling basis to any matriculated graduate student in the College of Arts and Humanities (http://www.arhu.umd.edu/) (ARHU) at the University of Maryland's College Park campus.

Admission is selective, and will be offered at the discretion of the program Director and the Advisory Board (http://dsah.umd.edu/people/). Considerations in admissions decisions will include the student's current academic standing, the extent to which students can demonstrate that their research or professional plans are compatible with the goals and objectives of the program, and—vitally—diversity.

We regret that we cannot offer admission to candidates who are not currently graduate students already enrolled in an ARHU department or program on the College Park campus, though enrollment in the Colloquium or other individual courses may be possible subject to instructor approval.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://dsah.umd.edu

Requirements

- Digital Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 163)

Ecological Economics, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Ecological Economics (Z009)

Graduate Certificate Program
College: Behavioral and Social Sciences

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.econ.umd.edu

Admissions
Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.econ.umd.edu

Requirements

- Ecological Economics, Post-Baccalaureate Certificate (P.B.C.) (p. 163)

Economic Analysis, Post-Baccalaureate Certificate (P.B.C.)

The Graduate Certificate in Economic Analysis (Z074) is awarded to students who have successfully completed the five core courses of the M.S. program.

Course	Title	Credits
Core Requirements		
ECON641	Microeconomic Analysis	3
ECON642	Topics in Applied Macroeconomics	3
ECON643	Empirical Analysis I: Foundations of Empirical Research	3
ECON644	Empirical Analysis II: Introduction to Economic Models	3
ECON645	Empirical Analysis III: Econometric Modeling and Forecasting	3
Total Credits		**15**

Economic Analysis (off-campus) (Z074)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The off-campus Graduate Certificate in Economic Analysis (Z074) is conferred to students who graduate after successfully completing the 5 core courses of the off-campus Master of Science in Applied Economics program (ECAO). Classes meet weeknights in Washington, DC.

The Z074 Graduate Certificate requirements are identical to those of the Z098 Graduate Certificate, but the Z098 certificate is conferred to students who graduate after successfully completing the 5 core courses of the on-campus ECAM program.

Financial Assistance

The economics department does not offer fellowships or graduate assistantships to any of the students in the Z074 Graduate Certificate program. To be eligible to receive any type of Federal Student Financial Aid, the student must:

1. be a U.S. citizen, U.S. Permanent Resident, or other eligible non-citizen
2. register with the Selective Service Administration (unless exempt). Students are exempt if they are female, under 18, born before 1960, on active duty in the U.S. Armed Forces, citizens of the Federated State of Micronesia or The Marshall Islands, or permanent residents of the Trust territory of the Pacific Islands (Palau).
3. enroll at a college or university that participates in the Federal Student Financial Aid Programs. These programs include the Federal Pell Grants (Pell Grants), Federal Supplemental Educational Opportunity Grants (FSEOG), Federal Subsidized and Unsubsidized Direct Loans, Federal Perkins Loans, and Federal Work-Study (FWS).
4. be working toward a degree or certificate.
5. be making Satisfactory Academic Progress.
6. not owe a refund on any federal grant, must not have borrowed federal student loans in excess of annual or aggregate loan limits, and must not be in default on any federal student loan unless satisfactory payment arrangements have been made.

Some of our students also have their tuition paid, at least in part, by an employer or other 3rd parties.

The University's Financial Services Center provides Third Party Billing when the third party requires a bill from the university. More information about financial aid is available from the University of Maryland's Office of Student Financial Aid.

Contact

Dr. John Straub, PhD
Program Director

Master of Science Program in Applied Economics

1400 16th Street, NW

Suite 140

Washington, DC 20036

Telephone: 202.525.4308
Email: DCmasters-econ@umd.edu

Website: http://masters.econ.umd.edu

Courses: ECON (https://umd-curr.courseleaf.com/graduate/courses/econ/)

Relationships: Applied Economics (off-campus) (ECAO) (https://academiccatalog.umd.edu/graduate/programs/applied-economics-

off-campus-ecao/), Applied Economics (on-campus) (ECAM) (https://academiccatalog.umd.edu/graduate/programs/applied-economics-on-campus-ecam/), Economic Analysis (on-campus) (Z098) (p. 165)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationappliedecon.pdf)
- Introductory Macroeconomics course (grade of B or higher)
- Introductory Microeconomics course (grade of B or higher)
- Calculus (grade of B or higher)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

The Economic Analysis (Z074) certificate program does not admit applicants with J1 visas, or applicants who would need the University of Maryland to sponsor an F1 student visa. But it does admit international applicants already in the US on visas that permit study (G4 and H4 visas, for example). G4 and H4 visa holders have the same application deadline as domestic applicants.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	June 15, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas	N/A	N/A

RESOURCES AND LINKS:
Program Website: masters.econ.umd.edu (https://masters.econ.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Economic Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 164)

Facilities and Special Resources

Classes are held in the evenings in our DC classroom space, 1400 16th Street NW, Suite 140.

Economic Analysis, Post-Baccalaureate Certificate (P.B.C.)

The Graduate Certificate in Economic Analysis (Z098) is awarded to students who have successfully completed the five core courses of the M.S. program.

Course	Title	Credits
Core Requirements		
ECON641	Microeconomic Analysis	3
ECON642	Topics in Applied Macroeconomics	3
ECON643	Empirical Analysis I: Foundations of Empirical Research	3
ECON644	Empirical Analysis II: Introduction to Economic Models	3
ECON645	Empirical Analysis III: Econometric Modeling and Forecasting	3
Total Credits		**15**

Economic Analysis (on-campus) (Z098)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The on-campus Graduate Certificate in Economic Analysis (Z098) is conferred to students who graduate after successfully completing the 5 core courses of the on-campus Master of Science in Applied Economics program (ECAM). Classes meet weeknights on campus in College Park.

The Z098 Graduate Certificate requirements are identical to those of the Z074 Graduate Certificate, but the Z074 certificate is conferred to students who graduate after successfully completing the 5 core courses of the off-campus ECAO program.

Financial Assistance

The economics department does not offer fellowships or graduate assistantships to any of the students in the Z074 Graduate Certificate program. To be eligible to receive any type of Federal Student Financial Aid, the student must:

1. be a U.S. citizen, U.S. Permanent Resident, or other eligible non-citizen
2. register with the Selective Service Administration (unless exempt). Students are exempt if they are female, under 18, born before 1960, on active duty in the U.S. Armed Forces, citizens of the Federated State of Micronesia or The Marshall Islands, or permanent residents of the Trust territory of the Pacific Islands (Palau).
3. enroll at a college or university that participates in the Federal Student Financial Aid Programs. These programs include the Federal Pell Grants (Pell Grants), Federal Supplemental Educational Opportunity Grants (FSEOG), Federal Subsidized and Unsubsidized Direct Loans, Federal Perkins Loans, and Federal Work-Study (FWS).
4. be working toward a degree or certificate.
5. be making Satisfactory Academic Progress.
6. not owe a refund on any federal grant, must not have borrowed federal student loans in excess of annual or aggregate loan limits,

and must not be in default on any federal student loan unless satisfactory payment arrangements have been made.

Some of our students also have their tuition paid, at least in part, by an employer or other 3rd parties. The University's Financial Services Center provides Third Party Billing when the third party requires a bill from the university. More information about financial aid is available from the University of Maryland's Office of Student Financial Aid.

Contact

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Website: http://masters.econ.umd.edu

Courses: ECON (https://umd-curr.courseleaf.com/graduate/courses/econ/)

Relationships: Applied Economics (off-campus) (ECAO) (https://academiccatalog.umd.edu/graduate/programs/applied-economics-off-campus-ecao/), Applied Economics (on-campus) (ECAM) (https://academiccatalog.umd.edu/graduate/programs/applied-economics-on-campus-ecam/), Economic Analysis (off-campus) (Z074) (p. 164)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationappliedecon.pdf)
- Introductory Macroeconomics course (grade of B or higher)
- Introductory Microeconomics course (grade of B or higher)
- Calculus (grade of B or higher)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

The Economic Analysis (Z098) certificate program does not admit applicants with J1 visas, or applicants who would need the University of Maryland to sponsor an F1 student visa. But it does admit international applicants already in the US on visas that permit study (G4 and H4 visas, for example). G4 and H4 visa holders have the same application deadline as domestic applicants.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	June 15, 2022
International Applicants	
F (student) or J (exchange visitor) visas	N/A

RESOURCES AND LINKS:
Program Website: masters.econ.umd.edu (https://masters.econ.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Economic Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 165)

Facilities and Special Resources

Classes meet weeknights on campus in College Park.

Economics, Master of Arts (M.A.)

Our department offers admission only to students interested in earning a Ph.D. Our program is not designed for students who are interested only in a Master's degree. However, our Ph.D. students may obtain an M.A. degree during their program, either as a terminal degree for students leaving the Ph.D. program, or as an intermediate sign of achievement for students who are continuing in the Ph.D. program. For students who are interested in applied economics, but are not pursuing a Ph.D., the University of Maryland offers a professional masters in applied economics. This program is designed for working professionals; it is not appropriate for a Ph.D. in economics. Contact masters-econ@umd.edu or visit http://masters.econ.umd.edu for more information.

Economics, Doctor of Philosophy (Ph.D.)

The Department of Economics at the University of Maryland prepares graduate students for careers in teaching, research, and government service. The course of study provides a solid foundation in economic theory, econometrics and applied fields. The Ph.D. requires:

1. completion of a three-course sequence and a written examination or field paper in a major field,
2. completion of a two-course sequence in a minor field,
3. completion of an econometrics sequence,
4. an additional supporting course in a theoretical or applied field, and
5. a dissertation.

In the third year, students begin directed research by participating in workshops appropriate to their dissertation research.

Advance to Candidacy: In addition to the course requirements below, students must successfully pass two written comprehensive examinations in microeconomic and macroeconomic theory, taken during the summer after the first year of study.

Post-Candidacy: Students must complete at least 12 credits of ECON899 Doctoral Dissertation Research and successfully defend and submit an original dissertation.

Course	Title	Credits
Core Requirements		
ECON623	Econometrics I	3
ECON624	Econometrics II	3
Select two of the following workshops, each in a different semester:		4
ECON808	Workshop on Macroeconomics, International Macroeconomics and International Finance	
ECON828	Workshop in Econometrics	
ECON848	Workshop in International Trade, Institutional Economics and Political Economy	
ECON868	Workshop in Industrial Organization, Microeconomic Theory and Behavioral and Experimental Economics	
ECON878	Workshop in Development, Labor and Public Economics	
Select three courses in a major field* [1]		6
Select two courses in a minor field* [1]		4
Select a supporting course at the 600-level or above* [2]		2
Dissertation Research Requirement		
ECON899	Doctoral Dissertation Research	12
Total Credits		**34**

1 Average grade of B+ or better

2 Grade of B- or better

* Credits may vary

Economics (ECON)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Economics Program offers graduate study leading to the Doctor of Philosophy degree. During the course of study toward the Ph.D., doctoral students also have the opportunity to obtain a Master of Arts degree. Areas of specialization include: Advanced Macroeconomics, Advanced Microeconomics, Behavioral and Experimental Economics, Comparative Institutional Economics, Econometrics, Economic Development, Economic History, Environmental and Natural Resource Economics, Industrial Organization, International Finance and Macroeconomics, International Trade, Labor Economics, Political Economy, and Public Economics.

Financial Assistance

All applicants will be considered for assistantships and fellowships through the regular application review process. Funding from the department is merit-based. Applicants should also be aware that we are an affirmative action department and that we are especially interested in recruiting strong African-American, Hispanic-American and Native American students to our Ph.D. program. As always, we will consider applications from students who have already secured an outside source of funding.

Contact

Coordinator of Graduate Studies
Department of Economics
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Telephone: 301.405.3544
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Email: vfletche@umd.edu

Website: https://www.econ.umd.edu/landing/Graduate **(**http://www.econ.umd.edu/landing/Graduate/**)**

Courses: ECON (p. 704)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s): Transcripts from all institutions attended after high school or secondary school whether or not a degree was received. Fall term transcripts need to be included for anyone still attending an institution.
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) is optional for Fall 2022
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationecon.pdf)
- Description of Research/Work Experience (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umddescriptionofresearchworkexperienceecon.pdf)
- Writing Samples (optional, up to 3)

By the application deadline, applicants should have completed advanced undergraduate courses in microeconomics, macroeconomics, and econometrics. Applicants are also expected to have completed the equivalent of three semesters of calculus, a semester of linear algebra, and a semester of differential equations. The majority of admitted students have also completed course work in real analysis or other upper-level mathematics. For admission for Fall 2022, submitting the Graduate Record Examination (GRE) Aptitude test is optional. All of the Department's graduate students are full-time students.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 15, 2021
International Applicants	

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 15, 2021

RESOURCES AND LINKS:
Program Website: https://www.econ.umd.edu/landing/Graduate (http://www.econ.umd.edu/landing/Graduate/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Economics, Doctor of Philosophy (Ph.D.) (p. 166)
- Economics, Master of Arts (M.A.) (p. 166)

Ecosystems Restoration, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Ecosystems Restoration (Z041)

Graduate Certificate Program
College: Agriculture and Natural Resources

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.oes.umd.edu

Admissions Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Program not currently accepting applications	Program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Program not currently accepting applications	Program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oes.umd.edu

Requirements

- Ecosystems Restoration, Post-Baccalaureate Certificate (P.B.C.) (p. 168)

Electrical and Computer Engineering, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

The M.S. program offers the thesis and non-thesis options. Students must satisfy a course requirement and complete either a thesis or scholarly paper. For complete details, see the ECE Graduate Handbook (http://www.ece.umd.edu/handbook/).

THESIS OPTION

Course	Title	Credits
Select three ENEE core courses		9
Remainder of coursework [1]		15
ENEE799	Master's Thesis Research	6
Total Credits		**30**

1. Additional ENEE & approved non-ENEE courses are accepted- must be at the 600-level or above but cannot include: ENEE 698, 699, 799, 898, 899

non-thesis option

Course	Title	Credits
Select four ENEE core courses		12
Remainder of coursework [1]		18
Complete a scholarly paper		
Total Credits		**30**

1. Additional ENEE & approved non-ENEE courses are accepted- must be at the 600-level or above but cannot include: ENEE 698, 699, 799, 898, 899

Electrical and Computer Engineering, Doctor of Philosophy (Ph.D.)

Advance to Candidacy: In addition to the course requirements below, students must satisfy a Ph.D. qualifying requirement as well as pass an oral Ph.D. research proposal examination.

Post-Candidacy: Students must complete at least 12 credits of ENEE899 Doctoral Dissertation Research as well as successfully defend and submit an original dissertation. For more details, see the ECE Graduate Handbook (http://www.ece.umd.edu/handbook/).

Course	Title	Credits
Graduate Technical courses [1]		18
ENEE698	Graduate Seminar	3
Two approved non-ENEE lecture courses		6
Remainder of coursework [2]		9
Doctoral Dissertation Research Requirement		
ENEE899	Doctoral Dissertation Research	12
Total Credits		**48**

1. Complete six ENEE lecture courses. These courses must be at the 600 level or above, not including ENEE698, ENEE699, ENEE799, ENEE898, and ENEE899.
2. A maximum of six credits of ENEE699 and ENEE799 combined may be included.

Electrical and Computer Engineering (ENEE)

Graduate Degree Program

College: Engineering

Abstract

The Department of Electrical and Computer Engineering (ECE) at the University of Maryland, College Park offers one of the strongest and most highly-ranked programs in the nation. Led by 89 full-time and affiliate faculty members and 50 research faculty and postdocs, the research programs of the department cover a wide spectrum of activities in the areas of:

- Communications and Networking
- Signal Processing
- Control, Robotics, and Dynamical Systems
- Computer Engineering
- Optics and Photonics
- Circuits and Systems
- Electronic Materials and Devices
- Bioelectronics and Systems
- Applied Electromagnetics

Our close affiliation with a number of research institutes such as the Institute for Systems Research, the Institute for Advanced Computer Studies, the Institute for Research in Electronics and Applied Physics, the Institute for Physical Science and Technology, and the Maryland Center for Integrated Nano Science and Engineering provides to our students and researchers the opportunity for team-oriented, cross-disciplinary research and access to the institutes' state-of-the-art laboratories.

ECE is a large department that offers a broad range of programs and research opportunities. Its research innovations are aimed at helping government and industry face today's most difficult global challenges. Employers and peer institutions recognize the prestige of Maryland's engineering programs.

Maryland's proximity to Washington, DC, offers unique research opportunities with national and government laboratories such as NASA's Goddard Space Flight Center, the National Institutes of Health, the National Institute of Standards and Technology, and the Army and Navy Research Labs. No other top Engineering program in the U.S. can provide such close proximity and access to national laboratories, federal government, and the Department of Defense.

The Department of Electrical and Computer Engineering offers graduate study leading to the Master of Science and Doctor of Philosophy degrees.

For additional information about the department's programs and research, please visit ece.umd.edu (http://www.ece.umd.edu).

Financial Assistance

Financial aid is available to graduate students in the form of research assistantships, teaching assistantships, and fellowships. Details are available in the ECE Graduate Handbook (http://www.ece.umd.edu/handbook/). Applicants for admission are automatically considered for these packages provided they mark "yes" for financial assistance on the application form and submit their materials by the preferred deadline.

Contact

Graduate Studies Office
Department of Electrical and Computer Engineering
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8223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3681
Fax: 301.405.8728
Email: ecegradstudies@umd.edu

Website: http://www.ece.umd.edu

Courses: ENEE (p. 757)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume
- Publications/Presentations (optional)

For the most current and detailed information regarding ECE graduate admissions and deadlines, please refer to our ECE Graduate Admissions (http://www.ece.umd.edu/grad/admissions/) web page. Applicants must follow all instructions detailed on this web page.

For admission to the graduate programs in electrical and computer engineering, students must hold an undergraduate degree in electrical or computer engineering or related field (math, computer science, physics, or other areas of engineering) and have an overall grade point average of B+ or better. In exceptional cases, students with a lower GPA may also be admitted. Other criteria include overall academic record, strength of recommendations, GRE score, and adequacy of preparation. Applicants are competitively judged by a faculty committee.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	April 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	March 4, 2022

RESOURCES AND LINKS:

Program Website: http://www.ece.umd.edu
Application Process: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Requirements

- Electrical and Computer Engineering, Doctor of Philosophy (Ph.D.) (p. 168)

- Electrical and Computer Engineering, Master of Science (M.S.) (p. 168)

Facilities and Special Resources

For detailed information on the department's research institutes and laboratories, please see the ECE Research Overview (https://ece.umd.edu/research/).

Electrical and Computer Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

The student chooses an area of concentration offered by an engineering department and completes 30 credit hours of approved coursework with an average grade of B. The coursework, which allows up to 12 credits at the 400-level, must be approved by the program's departmental faculty advisor.

Students complete six core courses and four electives. Two available focus areas include Computer Engineering (1) and Communication and Signal Processing (2).

Computer Engineering

Course	Title	Credits
Complete five of the following core courses:		15
ENPM617	Compilers	
ENPM607	Computer System Design and Architecture	
ENPM609	Microprocessor-Based Design	
ENPM610	Digital VLSI Design	
ENPM615	Embedded Systems	
ENPM674	Design and Synthesis of Digital Systems	
ENPM675	Operating System Design	
ENPM676	VLSI Testing and Design for Testability	
Select at least one of the following additional core courses:		3
ENPM600	Probability and Stochastic Processes for Engineers	
ENPM601	Analog and Digital Communication Systems	
ENPM602	Data Networks	
ENPM603	Theory and Applications of Digital Signal Processing	
ENPM616	Wireless Communications: Systems and Network Design Principles	
ENPM677	Wireless Sensor Networks	
ENPM611	Software Engineering	
ENPM612	System and Software Requirements	
ENPM613	Software Design & Implementation	
ENPM614	Software Testing & Maintenence	
ENPM696	Reverse Software Engineering	
ENPM808	Advanced Topics in Engineering (ENPM808E)	
Other pre-approved electives:		12
ENPM691	Hacking of C programs and Unix Binaries	
ENPM694	Networks and Protocols	
ENPM808	Advanced Topics in Engineering (ENPM808B)	
ENPM808	Advanced Topics in Engineering (ENPM808D)	
ENPM808	Advanced Topics in Engineering (ENPM808X)	
ENPM809	Special Topics in Engineering (ENPM809P)	
ENPM809	Special Topics in Engineering (ENPM809X)	
ENPM690	Course ENPM690 Not Found	
Total Credits		**30**

Communication and Signal Processing

Course	Title	Credits
Complete five of the following core courses:		15
ENPM600	Probability and Stochastic Processes for Engineers	
ENPM601	Analog and Digital Communication Systems	
ENPM602	Data Networks	
ENPM603	Theory and Applications of Digital Signal Processing	
ENPM616	Wireless Communications: Systems and Network Design Principles	
ENPM677	Wireless Sensor Networks	
Select at least one of the following additional core courses:		3
ENPM611	Software Engineering	
ENPM612	System and Software Requirements	
ENPM613	Software Design & Implementation	
ENPM614	Software Testing & Maintenence	
ENPM808	Advanced Topics in Engineering (ENPM808E)	
ENPM696	Reverse Software Engineering	
ENPM607	Computer System Design and Architecture	
ENPM609	Microprocessor-Based Design	
ENPM610	Digital VLSI Design	
ENPM615	Embedded Systems	
ENPM617	Compilers	
ENPM674	Design and Synthesis of Digital Systems	
ENPM675	Operating System Design	
ENPM676	VLSI Testing and Design for Testability	
Other pre-approved electives:		12
ENPM631	TCP/IP Networking	
ENPM632	Advanced TCP/IP Networking	
ENPM693	Network Security	
ENPM808	Advanced Topics in Engineering (ENPM808B)	
ENPM808	Advanced Topics in Engineering (ENPM808W)	
ENPM808	Advanced Topics in Engineering (ENPM808Y)	
ENPM808	Advanced Topics in Engineering (ENPM808Z)	
ENPM809	Special Topics in Engineering (ENPM809F)	
ENPM809	Special Topics in Engineering (ENPM809G)	
ENPM809	Special Topics in Engineering (ENPM809L)	
ENPM809	Special Topics in Engineering (ENPM809R)	
Total Credits		**30**

Electrical and Computer Engineering (PMEE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered by the Department of Electrical and Computer Engineering, our Master of Engineering program in electrical and computer engineering boasts a unique connection with prestigious institutes, advanced laboratories, and leading faculty. Students also benefit from a team-oriented, multidisciplinary program that helps strengthen professional networks and provides knowledge and experience in areas of communications and networking, signal processing control, computer engineering, and more. Students in this program choose from 1 of 2 tracks: Computer Engineering or Communications and Signal Processing.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: ENPM (https://umd-curr.courseleaf.com/graduate/courses/enpm/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Electrical and Computer Engineering, Master of Engineering (M.Eng.) (p. 170)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Electrical and Computer Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Students select either the Communication and Signal Processing sequence or the Computer Engineering sequence:

Computer Engineering

Course	Title	Credits
Required courses:		
ENPM607	Computer System Design and Architecture	3
ENPM609	Microprocessor-Based Design	3
ENPM610	Digital VLSI Design	3
Select one of the following:		3
ENPM611	Software Engineering	
ENPM675	Operating System Design	
ENPM676	VLSI Testing and Design for Testability	
ENPM691	Hacking of C programs and Unix Binaries	
Total Credits		**12**

Communication and Signal Processing

Course	Title	Credits
Required Courses:		
ENPM600	Probability and Stochastic Processes for Engineers	3
ENPM601	Analog and Digital Communication Systems	3
Select two of the following:		6
ENPM602	Data Networks	
ENPM603	Theory and Applications of Digital Signal Processing	
ENPM677	Wireless Sensor Networks	
ENPM616	Wireless Communications: Systems and Network Design Principles	
Total Credits		**12**

Electrical and Computer Engineering (Z057)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered by the Department of Electrical and Computer Engineering, our Master of Engineering program in electrical and computer engineering boasts a unique connection with prestigious institutes, advanced laboratories, and leading faculty. Students also benefit from a team-oriented, multidisciplinary program that helps strengthen professional networks and provides knowledge and experience in areas of communications and networking, signal processing control, computer engineering, and more. Students in this program choose from 1 of 2 tracks: Computer Engineering or Communications and Signal Processing.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: ENPM **(**https://umd-curr.courseleaf.com/graduate/courses/enpm/**)**

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Electrical and Computer Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 172)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		
ENME690	Mechanical Fundamentals of Electronic Systems	3
ENME695	Design for Reliability	3
Select two of the following:		6
ENME737	Application of AI in Reliability: Prognostics and Systems Health Management (PHM)	
ENME770	Life Cycle Cost and System Sustainment Analysis	
ENME780	Mechanical Design of High Temperature and High Power Electronics	
ENRE600	Fundamentals of Failure Mechanisms	
ENRE602	Principles of Reliability Analysis	
ENRE641	Probabilistic Physics of Failure and Accelerated Testing	
Total Credits		**12**

Electronic Packaging (online) (Z111)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our electronic packaging Graduate Certificate in Engineering leverages the university's unique strength in reliability along with its expertise in electrical engineering, mechanical engineering, materials science, and business to empower students to further careers in areas such as avionics, automotive electronics, industrial motor drives, military electronics, and medical equipment. Course topics include basics of electronic system integration, heat transfer, thermal management, stress analysis, cost analysis, quality and reliability assessment, and prognostics and health management.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Telephone: 301.405.7712
Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENRE (https://umd-curr.courseleaf.com/graduate/courses/enre/) ENME (https://umd-curr.courseleaf.com/graduate/courses/enme/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.) (p. 173)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements		
ENME690	Mechanical Fundamentals of Electronic Systems	3
ENME695	Design for Reliability	3
Select two of the following:		6
ENME737	Application of AI in Reliability: Prognostics and Systems Health Management (PHM)	
ENME770	Life Cycle Cost and System Sustainment Analysis	
ENME780	Mechanical Design of High Temperature and High Power Electronics	
ENRE600	Fundamentals of Failure Mechanisms	
ENRE602	Principles of Reliability Analysis	
ENRE641	Probabilistic Physics of Failure and Accelerated Testing	
Total Credits		**12**

Electronic Packaging (Z112)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our electronic packaging Graduate Certificate in Engineering leverages the university's unique strength in reliability along with its expertise in electrical engineering, mechanical engineering, materials science, and business to empower students to further careers in areas such as avionics, automotive electronics, industrial motor drives, military electronics, and medical equipment. Course topics include basics of electronic system integration, heat transfer, thermal management, stress analysis, cost analysis, quality and reliability assessment, and prognostics and health management.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate

FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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College Park, MD 20742
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Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENRE **(**https://umd-curr.courseleaf.com/graduate/courses/enre/**)** ENME **(**https://umd-curr.courseleaf.com/graduate/courses/enme/**)**

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0.

For additional program-specific admission requirements, please visit: https://mage.umd.edu/electronic-packaging (https://mage.umd.edu/electronic-packaging/).

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.) (p. 174)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

This program is also offered 100% online. Please see Electronic Packaging (Z111) for more information.

Elementary and Middle School Science Education, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Elementary & Middle School Science Education (Z051)

Graduate Certificate Program
College: Education

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.education.umd.edu

Admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Program not currently accepting applications	Program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Program not currently accepting applications	Program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Elementary and Middle School Science Education, Post-Baccalaureate Certificate (P.B.C.) (p. 175)

Energy Systems Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary

course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Students choose five core courses, and five elective courses. All electives must be approved by the student's advisor.

Course	Title	Credits
Select five of the following core courses:		15
ENCH648	Special Problems in Chemical Engineering (ENCH648K - Advanced Fuel Cells and Batteries)	
ENCH648	Special Problems in Chemical Engineering (ENCH648L - Photovoltaics: Solar Energy)	
ENME701	Sustainable Energy Conversion and the Environment	
or ENPM624	Renewable Energy Applications	
ENPM654	Energy Systems Management	
ENPM622	Energy Conversion I - Stationary Power	
ENPM627	Environmental Risk Analysis	
ENPM656	Energy Conversion II – Mobile Power	
Select five electives approved by advisor		15
Total Credits		**30**

Energy Systems Engineering (online) (MEEE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Drawing on the innovation and expertise of the University of Maryland Energy Research Center, the Energy Systems Engineering masters program prepares professional engineers for the multi-disciplinary challenges of this rapidly growing field. Students can build on the core coursework through our defined elective sets in reliability engineering and energy systems or by mixing and matching technical electives.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: ENCH **(**https://umd-curr.courseleaf.com/graduate/courses/ench/**)** ENPM **(**https://umd-curr.courseleaf.com/graduate/courses/enpm/**)**

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus/).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/application-process (https://mage.umd.edu/application-process/)
Program Website: mage.umd.edu (https://mage.umd.edu/)

Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Energy Systems Engineering, Master of Engineering (M.Eng.) (p. 175)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses (choose at least 3):		9
ENPM622	Energy Conversion I - Stationary Power	
ENPM624	Renewable Energy Applications	
ENPM654	Energy Systems Management	
ENPM656	Energy Conversion II -- Mobile Power	
Select one additional approved course		3
Total Credits		**12**

Energy Systems Engineering (online) (Z082)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Drawing on the innovation and expertise of the University of Maryland Energy Research Center, the Energy Systems Engineering masters program prepares professional engineers for the multi-disciplinary challenges of this rapidly growing field. Students can build on the core coursework through our defined elective sets in reliability engineering and energy systems or by mixing and matching technical electives.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

CONTACT

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Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: ENCH **(**https://umd-curr.courseleaf.com/graduate/courses/ench/**)** ENPM **(**https://umd-curr.courseleaf.com/graduate/courses/enpm/**)**

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 177)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Energy Systems Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Students choose five core courses, and five elective courses. All electives must be approved by the student's advisor.

Course	Title	Credits
Select five of the following:		15
ENCH648	Special Problems in Chemical Engineering (ENCH648K - Advanced Fuel Cells and Batteries)	
ENCH648	Special Problems in Chemical Engineering (ENCH648L - Photovoltaics: Solar Energy)	
ENME701	Sustainable Energy Conversion and the Environment	
or ENPM624	Renewable Energy Applications	
ENPM622	Energy Conversion I - Stationary Power	
ENPM627	Environmental Risk Analysis	
ENPM654	Energy Systems Management	
ENPM656	Energy Conversion II -- Mobile Power	
Select five electives approved by advisor		15
Total Credits		**30**

Energy Systems Engineering (PMSU)

Graduate Degree Program

College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Drawing on the innovation and expertise of the University of Maryland Energy Research Center, the Energy Systems Engineering masters program prepares professional engineers for the multi-disciplinary challenges of this rapidly growing field. Students can build on the core coursework through our defined elective sets in reliablity engineering and energy systems or by mixing and matching technical electives.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: ENCH (https://umd-curr.courseleaf.com/graduate/courses/ench/) ENPM (https://umd-curr.courseleaf.com/graduate/courses/enpm/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:
Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Energy Systems Engineering, Master of Engineering (M.Eng.) (p. 178)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Energy Systems Engineering (MEEE) for more information.

Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses (Choose at least 3):		9
ENPM622	Energy Conversion I - Stationary Power	
ENPM624	Renewable Energy Applications	
ENPM654	Energy Systems Management	
ENPM656	Energy Conversion II -- Mobile Power	
Select one additional approved course		3
Total Credits		**12**

Energy Systems Engineering (Z066)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Drawing on the innovation and expertise of the University of Maryland Energy Research Center, the Energy Systems Engineering masters program prepares professional engineers for the multi-disciplinary challenges of this rapidly growing field. Students can build on the core coursework through our defined elective sets in reliablity engineering and energy systems or by mixing and matching technical electives.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: ENCH (https://umd-curr.courseleaf.com/graduate/courses/ench/) ENPM (https://umd-curr.courseleaf.com/graduate/courses/enpm/)

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:

Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 179)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Energy Systems Engineering (Z082) for more information.

Engineering and Public Policy, Master of Engineering and Public Policy (M.Eng.Pub.Pol.)

This program is not currently accepting applications.

Engineering and Public Policy (MEPP)

Graduate Degree Program
College: Engineering / Public Policy

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments. Late afternoon, evening, and 100% online classes are taught by the College Park faculty and experienced adjunct faculty at the College Park campus and designated learning centers in Maryland. For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

CONTACT

Office of Advanced Engineering Education
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200

Office of Student Affairs
2101 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: https://mage.umd.edu/ **or** http://www.publicpolicy.umd.edu

Admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.eng.umd.edu or http://www.publicpolicy.umd.edu

Requirements

- Engineering and Public Policy, Master of Engineering and Public Policy (M.Eng.Pub.Pol.) (p. 180)

Facilities and Special Resources

Courses in the Professional Master of Engineering program are currently offered on the College Park campus, at off-campus centers via video-teleconferencing, and 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, the University Center of Northeastern Maryland in Harford County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs

English Language and Literature, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

The M.A. degree program requires 30 credit hours of graduate work distributed to assure coverage of major historical fields. The student either may take 24 hours of coursework and write a thesis for the other six hours, or may take 30 hours of coursework and do a capstone writing project. The department also offers a special M.A. with a Concentration in Composition and Rhetoric; this degree program requires 30 credit hours of graduate work, provides thesis and non-thesis options, and balances courses in literature with courses in the theory of composition and rhetoric.

Literature concentration

Course	Title	Credits
ENGL601	Literary Research and Critical Contexts	3
or ENGL602	Critical Theory and Literary Criticism	
Select one course in Critical Theory, Genre, or Rhetoric		3
Select one course in each of the following areas:		12
Medieval and Early Modern		
The Long 18th-century		
The Long 19th-century		
Modern and Contemporary		
Thesis or Non-thesis option:		**12**
Thesis:		
ENGL799	Master's Thesis Research	
Electives		
Non-thesis:		
Electives		
Writing Project		
Total Credits		**30**

Writing studies and rhetoric

Course	Title	Credits
ENGL607	Readings in the History of Rhetorical Theory to 1900	3
ENGL775	Seminar in Composition Theory	3
or ENGL776	Seminar in Modern Rhetorical Theory	
Select four additional ENGL designated courses		12
Thesis or Non-thesis option:		**12**
Thesis:		
ENGL799	Master's Thesis Research	
Electives		
Non-thesis:		
Electives		
Capstone Project		
Total Credits		**30**

English Language and Literature, Doctor of Philosophy (Ph.D.)

Advance to Candidacy: In addition to the course requirements below, students must pass a qualifying examination in their areas of specialization and demonstrate, through examination or coursework, evidence of competence in a second language related to their areas of specialization. During the semester students take their qualifying exam, they must enroll in a section of ENGL 898 Pre-Candidacy Research with their advisor to get guidance in preparing for the exam.

Post-Candidacy: Students must complete at least 12 credits of ENGL899 Doctoral Dissertation Research as well as successfully defend and submit an original dissertation.

A minimum of 30 credits of coursework is required for students entering the doctoral program without an M.A. A minimum of 24 credits of coursework is required for students entering the doctoral program with an M.A.

Course	Title	Credits
Core Requirements		
ENGL601	Literary Research and Critical Contexts (Course renamed: Introduction to Graduate Studies)	3
ENGL611	Approaches to College Composition	3
Professional development or writing-focused course		1
Reading knowledge of one language other than English		
Dissertation Research Requirements		

ENGL899	Doctoral Dissertation Research	12
Total Credits		**19**

English Language and Literature (ENGL)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of English offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees; particular strengths of the department include early British literature; American literature; literature of the African diaspora; postcolonial and transnational literary studies; digital humanities; feminist theory and gender studies; and composition and rhetoric. The Department also offers a Master of Fine Arts degree in Creative Writing (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?CRWR) (See listing for Creative Writing (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?CRWR)). Most students enrolled in graduate programs in English Language and Literature seek employment in higher education, but many also seek non-academic employment in publishing, business and technical writing, administration, and personnel management. To assist with placement, the department has a Placement Director and the university has a Career Development Center.

Financial Assistance

The English Department, in conjunction with the College of Arts and Humanities and the Graduate School, awards a combination of fellowships and teaching assistantships to admitted PhD candidates. Limited financial aid (usually in the form of teaching assistantships) is available to some incoming MA students.

Contact

Tawes Hall
7751 Alumni Drive
University of Maryland
College Park, MD 20742
Email: englishgrad@umd.edu
Website: http://www.english.umd.edu
Courses: ENGL (p. 771)
Relationships: Comparative Literature (CMLT) (p. 134), Creative Writing (CRWR) (p. 146)

Admissions

General Requirements

1. Statement of Purpose: A statement addressing the intended focus of your graduate studies and how your past educational experiences have prepared you for this course of study. If applicable, this statement would also be the place to address any unusual challenges that you may have faced during your academic career and/or the formative nature of any extracurricular activities (i.e. athletics, outreach activities, clubs, etc.) that may have had an impact on your intellectual development. (If you are applying to the PhD program but would like to be considered for the MA in the event that a PhD spot is unavailable, please also indicate that here.)
2. Transcript(s)
3. TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

1. Letters of Recommendation (3)
2. Academic CV
3. Writing Sample: A single sample of critical writing of approximately 12-20 pages. While we encourage you to submit your best writing sample, we prefer a writing sample in your declared field of interest. The writing sample should include an updated works cited page to help us evaluate your critical and theoretical familiarity with a field, a period or a genre. (Uploaded to the Upload Requirements section of the application).

In addition to fulfilling Graduate School requirements, applicants to the M.A. degree program should present a 3.5 GPA in English and 24 hours of upper-level English courses. Applicants to the Ph.D. degree program should present at least a 3.7 GPA and a B.A. degree, normally in English Language and Literature. All M.A. and Ph.D. applicants should submit a single critical writing sample of 12-20 pages as indicated on the application guidelines. We accept general GRE scores but are waiving the requirement due to the COVID-19 pandemic. For best consideration, complete applications for all degree programs should be submitted by December 1. Applications are not accepted after December 1. The Admissions Committee will begin reviewing applications immediately. Admission is for the Fall semester only.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 1, 2021

RESOURCES AND LINKS:
Program Website: http://www.english.umd.edu
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- English Language and Literature, Doctor of Philosophy (Ph.D.) (p. 181)
- English Language and Literature, Master of Arts (M.A.) (p. 181)

Facilities and Special Resources

Resources for research in the College Park and Washington, D.C. area are unsurpassed. The university's libraries hold over 2,000,000 volumes. In addition to the outstanding holdings of the Library of Congress, the area also offers the specialized resources of the Folger Shakespeare Library,

Dumbarton Oaks, the National Archives, the Smithsonian Institution, and the National Center for the Study of the Visual Arts among others

UMCP is a member of the Consortium of Institutions in the Washington area, which permits graduate students at College Park to enroll in courses at other universities for graduate credit at UMCP. Graduate students in English also may take courses for graduate credit at the Folger Institute, which runs a series of seminars by distinguished scholars each year.

Entomology, Master of Science (M.S.)

Thesis only: 30 credits

Students in the Entomology M.S. Program are required to complete 24 credits of coursework, including two core courses and three graduate topic seminars (ENTM798 or equivalent). The three topic seminars must include a Responsible Conduct of Research seminar. In addition, students are required to register for and attend all Entomology Colloquium seminars and complete 6 credits of ENTM799. Please note, M.S. students that hold a Teaching Assistantship must complete a course in TA training, which is currently offered as ENTM701.

The Entomology M.S. program provides diverse opportunities for the selection of a thesis question and composition a thesis advisory committee.

Other program requirements include a minimum of one thesis advisory committee meeting per year and submission of an annual progress report. Students in the M.S. program are required to present their final thesis research to the department in a public seminar, such as the Entomology Colloquium Series.

Course	Title	Credits
Required courses:		
BSCI481	Insect Diversity and Classification	4
BSCI482	Insect Physiology and Molecular Biology	4
Remainder of coursework approved with advisor:		16
Complete three topic seminars (ENTM798 or equivalent) including a seminar in Responsible Conduct of Research		
Entomology Colloquium (ENTM788C) each semester		
*TA training (ENTM701) is required for students with a Teaching Assistantship)		
Thesis research:		
ENTM799	Master's Thesis Research	6
Total Credits		**30**

Entomology, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 28 credits of coursework, including three core courses and five topic seminars (ENTM798 or equivalent). The five topic seminars must include a Responsible Conduct of Research seminar. In addition, students are required to register for and attend all Entomology Colloquium seminars until they advance to candidacy by passing an oral qualifying exam and proposal defense. Candidates must complete 12 credits of ENTM899. Please note, doctoral students that hold a Teaching Assistantship must complete a course in TA training, which is currently offered as ENTM701.

The Ph.D. program provides diverse opportunities for the selection of a dissertation question, composition of a dissertation advisory committee, and selection of an area of specialization. Each student's specialization is determined under the guidance of the dissertation advisory committee.

Other program requirements include a minimum of one dissertation advisory committee meeting per year and submission of an annual progress report.

Advance to Candidacy: In addition to the course requirements, students must pass an oral qualifying examination and proposal defense for advancement to candidacy.

Post-Candidacy: Complete at least 12 credits of ENTM899 Doctoral Dissertation Research and successfully defend and submit an original dissertation. Doctoral students are required to present their final dissertation research to the department in a public seminar, such as the Entomology Colloquium seminar series.

Course	Title	Credits
Required courses:		
BSCI480	Arthropod Form and Function	4
BSCI481	Insect Diversity and Classification	4
BSCI482	Insect Physiology and Molecular Biology	4
Remainder of Coursework Approved with Advisors		16
ENTM798	Topic Seminar (Complete five topic seminars including a seminar in Responsible Conduct of Research)	
ENTM788	Entomological Topics ((ENTM788C Entomology Colloquium each semester until candidacy))	
*TA training (ENTM701) is required for students with a Teaching Assistantship)		
Dissertation Research Requirements		
ENTM899	Doctoral Dissertation Research	12
Total Credits		**40**

Entomology (ENTM)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Department of Entomology offers Doctor of Philosophy and Master of Science degrees. Graduate students may conduct research in a range of both basic and applied topics, including insect ecology and behavior; physiology, morphology, evolution and biosystematics; insect pathology, molecular biology and genetics; aquatic entomology; pollinator biology and apiculture; and integrated pest management.

Employment opportunities for graduates exist in industry; academia and extension; federal, state, and local governments; private and non-profit arenas; and in international and national spheres.

Financial Assistance

Graduate students are supported primarily in two ways. Many students are supported by extramural funding sources, usually obtained by the student's faculty advisor or by the student for research on a specific topic. The second type of support is provided by the department from internal funds via University and departmental fellowships and teaching and research assistantships. Teaching and research assistantships are available on a competitive basis. Teaching assistants usually instruct undergraduate laboratory and recitation classes and receive in return a tuition waiver

of ten credits each semester. Those students whose records indicate superior academic achievement and promise may also be competitive for University and departmental fellowships. Several part-time employment opportunities are also available in governmental and private research laboratories in the area. Regardless of the initial source of funding, the department makes a financial commitment to each graduate student. In the case of master's students, support is provided for the first three years of the program only. In the case of doctoral students, five years of support is provided but must be used during the first six years of the student's program. Support is usually for the full 12 months per year.

Contact

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University of Maryland
College Park, MD 20742
Telephone: 301-405-7519
Fax: 301-314-9290
Email: jshultz@umd.edu

Website: http://www.entm.umd.edu

Courses: BSCI (https://umd-curr.courseleaf.com/graduate/courses/bsci/) ENTM (https://umd-curr.courseleaf.com/graduate/courses/entm/)

Relationships: Biological Sciences (BISI) (p. 83); Marine, Estuarine, and Environmental Sciences (MEES) (p. 278)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Optional Writing Samples (up to 2)

Students applying for graduate work in entomology are expected to have a strong background in the biological or agricultural sciences, chemistry, genetics, and mathematics. An undergraduate degree in entomology is not required, but a strong basic preparation is preferred for admission to the program.

Admission is granted on the basis of the following criteria by the Graduate Affairs Committee: Analysis of transcripts, including course selection and GPA; letters of recommendation; statement of purpose; and acceptance by a graduate faculty advisor. International applicants must also submit proof of English proficiency (TOEFL, iBT or IELTS scores). Acceptance by an advisor is absolutely required; thus, it helps to make contact with faculty when applying.

Upon admission to the MS or PhD program, the student's study committee suggests a program of coursework and approves a detailed research proposal.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 1, 2021

RESOURCES AND LINKS:
Program Website: http://www.entm.umd.edu
Program Admissions Website: https://entomology.umd.edu/admissions.html
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Entomology, Doctor of Philosophy (Ph.D.) (p. 183)
- Entomology, Master of Science (M.S.) (p. 183)

Facilities and Special Resources

Overview

The department is housed in a modern research facility on the College Park campus, where state-of-the-art offices, laboratories, environmental growth chambers, multimedia classrooms, and lecture halls provide an excellent environment for research and teaching. Students have individual workstations and access to sophisticated computer graphic facilities. The department also shares extensive technical expertise and scientific equipment with other departments on campus. The University's strategic location in the Washington, DC area provides many opportunities for students to conduct research and gain hands-on experience in federal facilities, such as the Smithsonian Institution, USDA-ARS Beltsville Agricultural Research Center, Walter Reed Army Institute of Research, NIH, and more. Vast resources are available in the University's library system and nearby federal libraries. The USDA's National Agriculture Library at Beltsville is only four miles from campus, and the Library of Congress is in nearby Washington, DC. Besides the main campus, the Maryland Agriculture Experiment Station has Research & Education Centers in the state where field and laboratory work is carried out on urban and agricultural insects. Land use and technical services at these centers are available to faculty and students.

Institutional Partners

The University of Maryland is a large Research University located just outside of Washington, DC. Our unique location enables us to offer research opportunities with neighboring universities, research institutes, and state and federal laboratories, including:

- USDA Beltsville Agricultural Research Center (https://www.ars.usda.gov/northeast-area/beltsville-md-barc/beltsville-agricultural-research-center/)

- Smithsonian National Museum of Natural History (https://naturalhistory.si.edu/)
- Smithsonian Conservation Biology Institute (https://nationalzoo.si.edu/center-for-conservation-genomics/)
- NASA Applied Sciences Program DEVELOP (https://develop.larc.nasa.gov/about.php)
- National Institutes of Health (https://www.nih.gov/)
- Walter Reed Army Institute of Research (https://www.wrair.army.mil/)
- United States Department of Agriculture National Institute of Food and Agriculture (https://nifa.usda.gov/)
- USGS Patuxent Wildlife Research Center (https://www.usgs.gov/centers/pwrc/)
- Environmental Protection Agency (https://www.epa.gov/)
- National Park Service (https://www.nps.gov/)

Campus Resources

The Plant Sciences Building is adjacent to the Biology-Psychology, Bioscience Research, and Microbiology Buildings, which facilitates interaction between multiple departments – Entomology, Plant Sciences, Biology, Cell Biology & Molecular Genetics, Neuroscience & Cognitive Science, and Microbiology – in a highly collaborative environment.

Research Farms & Greenhouse

The department is affiliated with both the College of Computer, Mathematics & Natural Sciences (https://cmns.umd.edu/) (CMNS) and Agriculture & Natural Resources (https://agnr.umd.edu/) (AGNR). Our close ties to AGNR allow faculty and students to utilize the Maryland Agricultural Experiment Station, which maintains Research & Education Centers at nine sites across the state where field and laboratory work is carried out on urban and agricultural insects.

At each research farm, faculty and students have access to plot space and experienced farm crews that can help maintain research/training plots. Each farm is equipped with tractors, planters, sprayers and irrigation equipment as well as crop management and harvest equipment to carry out research. Each facility is also equipped with wagons for transporting stakeholders on farm tours.

Faculty and students also have access to a state-of-the-art greenhouse (https://agnr.umd.edu/research/research-and-education-centers-locations/research-greenhouse-complex/) on campus. This resource is a 2-acre site with 45,000 square feet in greenhouse space and an outdoor nursery area.

Insect Rearing & Animal Housing

Insect rearing facilities include Percival incubators within laboratories and walk-in growth chambers in the department, all of which have temperature, light and humidity controls. A fly food facility (housed on the 5th floor of the Plant Sciences Building) is shared by five fly groups on campus, providing fly food to each once per week at minimal cost.

The Animal & Avian Sciences Building provides housing for the animal subjects (https://ansc.umd.edu/research/research-facilities/) involved in research and teaching programs at UMD. The facility can accommodate mammalian, reptilian, avian, and aquatic animal subjects. It contains modern, climate controlled, and restricted access space for animal housing, as well as ancillary rooms used to perform surgeries, conduct research, mix feed, and wash cages. This facility is located within walking distance of the Plant Sciences Building.

High Performance Computing

Faculty and students at UMD are provided access to Deepthought2, MARCC/Bluecrab, and Juggernaut high-performance computing clusters (http://hpcc.umd.edu/) through the Division of Information Technology (DIT). A variety of open-source software packages relevant to biological research are available, maintained, and updated on these clusters by DIT.

Core Facilities

The College of Computer, Mathematics, and Natural Sciences and the University maintain a large number of Core Facilities (http://biosciencecores.umd.edu/), all of which are available to faculty and students.

- Imaging Core (http://biosciencecores.umd.edu/imaging.html)
- Genomics Core (http://biosciencecores.umd.edu/genomics.html)
- Proteomics Core (http://biosciencecores.umd.edu/proteomics.html)
- Flow Cytometry Core (http://biosciencecores.umd.edu/flow-cytometry.html)

Environmental Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Select seven of the following:		21
ENCE630	Environmental and Water Resource Systems I	
ENPM621	Heat Pump and Refrigeration Systems Design Analysis	
ENPM622	Energy Conversion I - Stationary Power	
ENPM623	Engineering Combustion Emissions for Air Pollution Control	
ENPM624	Renewable Energy Applications	
ENPM625	Heating, Ventilation and Air Conditioning of Buildings	
ENPM626	Waste and Biomass Energy Conversion	
ENPM627	Environmental Risk Analysis	
ENPM635	Thermal Systems Design Analysis	
ENPM651	Heat Transfer for Modern Application	
Select three technical electives approved by advisor		9
Total Credits		**30**

Environmental Engineering (PMEN)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers

and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

This program prepares graduates to better preserve and protect human and environmental health from harmful activities, contaminants, and pathogens. Courses provide insight into pressing issues such as drinking water supply and treatment, wastewater treatment, air pollution management, solid waste management, and sustainable energy systems.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
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College Park, MD 20742
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Email: schaplin@umd.edu

Website: https://mage.umd.edu/

Courses: ENPM (https://umd-curr.courseleaf.com/graduate/courses/enpm/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:
Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Environmental Engineering, Master of Engineering (M.Eng.) (p. 185)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Select four of the following:		12
ENPM621	Heat Pump and Refrigeration Systems Design Analysis	
ENPM622	Energy Conversion I - Stationary Power	
ENPM623	Engineering Combustion Emissions for Air Pollution Control	
ENPM624	Renewable Energy Applications	
ENPM625	Heating, Ventilation and Air Conditioning of Buildings	
ENPM626	Waste and Biomass Energy Conversion	
ENPM627	Environmental Risk Analysis	
ENPM635	Thermal Systems Design Analysis	
ENPM651	Heat Transfer for Modern Application	
Total Credits		**12**

Environmental Engineering (Z058)

Graduate Certificate Program

College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

This program prepares graduates to better preserve and protect human and environmental health from harmful activities, contaminants, and pathogens. Courses provide insight into pressing issues such as drinking water supply and treatment, wastewater treatment, air pollution management, solid waste management, and sustainable energy systems.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Maryland Applied Graduate Engineering
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4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENPM (https://umd-curr.courseleaf.com/graduate/courses/enpm/)

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0.

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 186)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Environmental Health Sciences, Master of Science (M.S.)

Thesis option: 32 credits
Non-thesis option: 32 credits

Course	Title	Credits
Required courses:		
MIEH600	Foundations of Environmental Health	3
MIEH720	Principles of Toxicology	3
MIEH740	Environmental Health Risk Assessment	3
MIEH771	Exposure Assessment of Environmental Hazards	3
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
MIEH609	Methods in Environmental Health	3
SPHL611	Public Health Ethics	1
or SPHL612	Research Ethics	
MIEH688	Seminar in the Maryland Institute for Applied Environmental Health: Current Topics in Environmental Health	2
SPHL600	Foundations of Public Health	3
Thesis or Non-thesis option:		**6**
Thesis:		
MIEH799	Master's Thesis Research	
Non-thesis:		
MIEH789	Independent Study	
Elective		
Total Credits		**32**

Environmental Health Sciences, Doctor of Philosophy (Ph.D.)

The PhD program in Environmental Health Sciences consists of a minimum of 46 credit hours of graduate courses depending on the incoming student's previous coursework. In particular, students without an MPH degree will require additional coursework as required by the public health accrediting body (CEPH). Graduate courses include (1) core courses within environmental health, epidemiology and biostatistics; (2) supporting courses in environmental health research, ethics, public health, and grant writing; (3) specialized courses selected within the research foci; and (4) dissertation credits. The program can be completed on either a full- or part time basis. It is anticipated that students will complete more than the minimum number of credits.

Advance to Candidacy: Students must successfully complete a written and oral comprehensive exam in order to advance to candidacy.

Post-Candidacy: Students must pass an oral defense of a written dissertation research proposal, complete a minimum of 12 credits of MIEH899 doctoral dissertation research, as well as submit and defend an original dissertation.

Some core coursework may be waived based on previous courses taken at UMD or in another master's program. Students would not be able to waive out of all rotations or the seminar requirements. Rotations can be in physical labs or with faculty conducting non-laboratory based research. At least 1 rotation must be outside of the students focus area. Students would not be able to waive out of any of the 12 to 15 credits required for the specialization area. No more than 6 credits of MIEH 898 could be taken as part of the specialization area.

Course	Title	Credits
MIEH600	Foundations of Environmental Health	3
MIEH700	Advanced Environmental Health	3
MIEH720	Principles of Toxicology	3
MIEH740	Environmental Health Risk Assessment	3
MIEH771	Exposure Assessment of Environmental Hazards	3
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
EPIB651	Applied Regression Analysis	3
MIEH609	Methods in Environmental Health	3
SPHL611	Public Health Ethics	1
or SPHL612	Research Ethics	
MIEH688	Seminar in the Maryland Institute for Applied Environmental Health: Current Topics in Environmental Health	3
MIEH899	Doctoral Dissertation Research	12
SPHL600	Foundations of Public Health	3
Specialization courses		15
Total Credits		**60**

Environmental Health Sciences (ENVH)

Graduate Degree Program
College: School of Public Health

abstract

The **M.S. program** in Environmental Health Sciences, within the Maryland Institute for Applied Environmental Health (https://sph.umd.edu/academics/departments-units/maryland-institute-applied-environmental-health/) (MIAEH), School of Public Health, provides advanced graduate-level training with a focus on research and mitigation of major public health concerns influenced by environmental issues. The M.S. in Environmental Health Sciences covers an essential core of knowledge in environmental health and exposures sciences, epidemiology and biostatistics and includes completion of practical research training, culminating in a Master's Thesis. Within the program, there is a significant public health focus on populations of high vulnerability or those underserved, including those experiencing environmental injustice due to poverty or race. See our website (https://sph.umd.edu/academics/masters-degrees/ms-environmental-health-sciences/) for more information.

Students in the **Ph.D. program** in Environmental Health Sciences master an essential core of knowledge in environmental health, epidemiology and biostatistics. Elective courses and rotations with faculty, in field studies and/or laboratories provide students key skills required to specialize within the broader area of environmental health and become independent researchers. There is a significant research focus on events or outcomes affecting populations of high vulnerability or those underserved; including those experiencing environmental injustice due to poverty or race. See our website (https://sph.umd.edu/academics/doctoral-degrees/phd-environmental-health-sciences/) (https://sph.umd.edu/academics/masters-degrees/ms-environmental-health-sciences/)for more information.

CONTACT

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Email: mrocque@umd.edu (https://academiccatalog.umd.edu/graduate/programs/environmental-health-sciences-envh/mrocque@umd.edu)

Website: http://sph.umd.edu/department/miaeh (http://sph.umd.edu/department/miaeh/)

Courses: MIEH (https://umd-curr.courseleaf.com/graduate/courses/mieh/) SPHL (https://umd-curr.courseleaf.com/graduate/courses/sphl/)

Admissions

GENERAL ADMISSION REQUIREMENTS

- Minimum 3.0 undergraduate GPA
- At least one undergraduate math course (M.S. applicants)
- Transcripts from all previous coursework
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose and objectives including career and educational goals, professional experience, and areas of interest

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS Application (https://sophas.org/): Applications for this School of Public Health Program must first be submitted through the Public Health application system, www.SOPHAS.org (https://sophas.org/). SPH applicants should only complete the UMD application after their SOPHAS application has been verified and you have been notified to complete the UMD application
- Graduate Record Examination (GRE) (optional)

Note: Course work in environmental health or science, or public health/public policy, or biological/chemical sciences, or biochemistry, or biotechnology, or engineering, or geography/geology, or math, or biostatistics, or epidemiology, or medical sciences, or anthropology, preferred.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Ph.D. - December 10, 2021 (priority) / March 11, 2022 (final)
	M.S. - January 14, 2022 (priority) / June 3, 2022 (final)
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Ph.D. - December 10, 2021 (priority) / March 11, 2022 (final)
	M.S. - January 14, 2022 (priority) / March 11, 2022 (final)

RESOURCES AND LINKS

Ph.D. Program Website: (https://sph.umd.edu/academics/doctoral-degrees/phd-environmental-health-sciences/**)**https://sph.umd.edu/academics/doctoral-degrees/phd-environmental-health-sciences (https://sph.umd.edu/academics/doctoral-degrees/phd-environmental-health-sciences/)
M.S. Program Website: https://sph.umd.edu/academics/masters-degrees/ms-environmental-health-sciences (https://sph.umd.edu/academics/masters-degrees/ms-environmental-health-sciences/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Environmental Health Sciences, Doctor of Philosophy (Ph.D.) (p. 188)
- Environmental Health Sciences, Master of Science (M.S.) (p. 187)

Environmental Health Sciences, Master of Public Health (M.P.H.)

Non-thesis only: 45 credits

Course	Title	Credits
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
MIEH600	Foundations of Environmental Health	3
MIEH720	Principles of Toxicology	3
MIEH740	Environmental Health Risk Assessment	3
MIEH770	Law and Policy in Environmental Health	3
MIEH771	Exposure Assessment of Environmental Hazards	3
MIEH780	Occupational Health	3
MIEH786	Capstone Project in Public Health	3
MIEH778	Internship in Public Health	4
Electives		6
Total Credits		**45**

Environmental Health Sciences (MIEH)

Graduate Degree Program
College: School of Public Health

Abstract

The MPH program within the Maryland Institute for Applied Environmental Health (https://sph.umd.edu/academics/departments-units/maryland-institute-applied-environmental-health/), School of Public Health, prepares graduates to work in public health service as practitioners, researchers, administrators, and consultants. The mission of the MPH program with a concentration in Environmental Health Sciences is to promote the development of professional practitioners and researchers in environmental health who understand the science, theory and practice of public and environmental health, and can apply this knowledge toward the detection, management, and prevention of environmental health problems. There is a significant focus on health outcomes in populations of high vulnerability or those that are underserved, including those experiencing environmental injustice due to poverty or race. See our website (https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-environmental-health-sciences/) for more information.

Contact

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Website: http://sph.umd.edu/department/miaeh **(**http://sph.umd.edu/department/miaeh/**)**

Courses: MIEH SPHL **(**https://umd-curr.courseleaf.com/graduate/courses/sphl/**)**

Relationships: Behavioral and Community Health (BCHL) (p. 70), Behavioral and Community Health (MBCH) (p. 72), Biostatistics (BIOS) (p. 87), Epidemiology (EPDM) (p. 194), Epidemiology (EPID) (p. 195), Health Administration (HLSA) (p. 224), Maternal and Child Health (MCHS) (p. 285), Toxicology (TOXI) (p. 404)

Admissions

GENERAL ADMISSION REQUIREMENTS

- A Bachelor's degree
- Minimum 3.0 undergraduate GPA
- Transcripts from all previous coursework
- At least one undergraduate math course
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose and objectives including career and educational goals, professional experience, areas of interest, and faculty you are interested in working with

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS application (Step 1) & UMD Supplemental application (Step 2)
- Three letters of recommendation
- Resume or curriculum vitae
- Official GRE test scores submission is optional*
- Fit between applicant's goals and expectations and program degree competencies
- A writing sample is optional, such as a published manuscript, undergraduate or graduate thesis, research paper. If you submit a published manuscript and you are not the first author, describe the contributions you made to the publication
- Applicants being considered for the program will be invited for a virtual interview via Zoom
  **The review committee will evaluate GRE scores if they are submitted. The lack of scores will not negatively impact applications. If submitted, the program considers competitive scores to be 50th percentile or higher in each of the three parts.*
  Note: course work in environmental health or science, or public health/public policy, or biological/chemical sciences, or biochemistry, or biotechnology, or engineering, or geography/geology, or math, or biostatistics or epidemiology, or medical sciences, or anthropology, preferred.

The MPH in Environmental Health Sciences program has a two-step application process. Applicants first submit the SOPHAS application (www.sophas.org (https://sophas.org/)), the centralized application service for schools and programs of public health (Step 1). Once the SOPHAS application has been verified applicants will submit their UMD Supplemental application (Step 2). Applicants will receive an email from the SPH Admissions team with instructions for how to complete the UMD Supplemental Application. Applications will not be reviewed until both the SOPHAS and UMD Supplemental applications are completed.

For detailed instructions on how to submit your application, please visit the School of Public Health Website: (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/))

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Dec. 17, 2021 (priority SOPHAS) / Jan. 14, 2022 (priority UMD Supplemental)	N/A
	May 6, 2022 (final SOPHAS) / June 3, 2022 (final UMD Supplemental)	
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Dec. 17, 2021 (priority SOPHAS) / Jan.14, 2022 (priority UMD Supplemental)	N/A
	Feb. 11, 2022 (final SOPHAS) / Mar. 11, 2022 (final UMD Supplemental)	

RESOURCES AND LINKS

Program Website: https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-environmental-health-sciences (https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-environmental-health-sciences/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)

Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Environmental Health Sciences, Master of Public Health (M.P.H.) (p. 189)

Facilities and Special Resources

The proximity of the University of Maryland, College Park to the nation's capital offers prospective students unparalleled opportunities for internships and research experiences in public health, including placements at the National Institutes of Health, the CDC Washington Office, the U.S. Department of Health and Human Services, Children's National Medical Center, the Maryland Department of Health and Mental Hygiene, and many other national, state, and local health agencies. The diversity of cultural and socioeconomic groups, communities, industries, and health organizations provides a rich environment for learning, research, public policy analysis, and service.

Environmental Policy, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Environmental Policy (EPOL)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.publicpolicy.umd.edu

Admissions

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Environmental Policy, Post-Baccalaureate Certificate (P.B.C.) (p. 191)

Environmental Policy, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Environmental Policy (Z008)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Environmental Policy, Post-Baccalaureate Certificate (P.B.C.) (p. 191)

Environmental Science and Technology, Master of Science (M.S.)

Thesis only: 30 credits

Students must complete 30 credits of coursework including 6 credits of thesis research. All students must select an area of specialization and complete the specific track requirements.

Course	Title	Credits
Required courses:		
ENST602	Research Principles and Methodology in Environmental Scienceand Technolgy	3
ENST702	Environmental Science and Technology: Communication and Professional Development	2
ENST798	Graduate Seminar	2
ENST799	Master's Thesis Research	6
One graduate level statistics course		4
Choose an area of specialization		**minimum of 12 credits**

Soil and Watershed Sciences:	
Courses must be from the following five areas: soil chemistry, soil physics, pedology, soil biology, soil fertility	
Ecological Technology Design:	
Six credits of graduate level courses in ecology and six credits of graduate level courses in ecological design or related engineering courses	
Wetland Science:	
Minimum of three credits must be earned from each of these groups: Ecology, Soil Science, and Hydrology	
Ecosystem Health & Natural Resource Management:	
ENST604	Advanced Ecological and Natural Resource Ethics
Nine additional credits in Ecosystem Health and Natural Resource Management	

Environmental Science and Technology, Doctor of Philosophy (Ph.D.)

All ENST Ph.D. students are expected to complete a minimum of 50 credits beyond the B.S. degree (in addition to research credits ENST898 and ENST899) and are required to complete ENST602, ENST702 and two graduate level statistics courses (these can be taken during either the M.S. or Ph.D. program), and two semesters of Graduate Seminar (ENST798) beyond any ENST798 taken during the MS program. Each student must have completed (prior to or during the PhD) all the courses (12 credits) required for the MS specialization. In addition, each student must take courses during the PhD as specified below for the specialization. Each student's advisory committee needs to approve all specialization courses.

Advance to Candidacy: In addition to the course requirements, students must successfully pass a comprehensive exam and submit a research proposal approved by the student's committee.

Post-Candidacy: Complete at least 12 credits of ENST899 Doctoral Dissertation Research and successfully defend and submit an original dissertation.

Course	Title	Credits
Required courses:		
ENST602	Research Principles and Methodology in Environmental Scienceand Technolgy	3
ENST702	Environmental Science and Technology: Communication and Professional Development	2
ENST798	Graduate Seminar	2
ENST799	Master's Thesis Research	6
Select two graduate level statistics courses, if not already completed in the M.S. program		
Choose one of the four areas of specialization		
Soil and Watershed Sciences:		
Complete one semester of graduate level physical chemistry or biochemistry and at least one additional graduate level course in chemistry, biochemistry, physics, mathematics, engineering, or computer science		
Ecological Technology Design:		
Complete one semester of graduate level systems modeling and one additional graduate level course in ecology, ecological design or ecological engineering		
Wetland Science:		
Complete one graduate level course in modeling; two additional graduate level courses from within the areas of Ecology, Soil Science, or Hydrology		
Ecosystem Health and Natural Resource Management:		
Complete three additional graduate level courses in Ecosystem Health and Natural Resource Management		
Dissertation Research Requirements		
ENST899	Doctoral Dissertation Research	12

Environmental Science and Technology (ENST)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Department of Environmental Science and Technology (ENST) offers graduate programs leading to the Master of Science and Doctor of Philosophy degrees. ENST students can choose to work within one of four specializations: Soil and Watershed Sciences; Ecological Technology Design; Wetland Science; Ecosystem Health and Natural Resource Management.

Financial Assistance

ENST offers a number of graduate assistantships to qualified applicants that are awarded on a competitive basis. To apply, use the form for requesting financial assistance included in the Graduate School application packet. In addition to a competitive stipend, graduate assistants receive tuition remission and are offered excellent health benefits by the University of Maryland.

Contact

Tina Scites
Administrative Assistant and Graduate Coordinator
Department of Environmental Science and Technology
1426 Animal Sciences/Agricultural Engineering Building
8127 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1198
Fax: 301.314.9023
Email: tscites@umd.edu

Martin C. Rabenhorst, PhD
Director of Graduate Studies
Department of Environmental Science and Technology
1109 H.J. Patterson Hall
4065 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1343
Fax: 301.314.2763
Email: gradstudies-enst@umd.edu

Website: http://www.enst.umd.edu

Courses: ENST

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://drupal-base-s3-drupalshareds3-1qwpjwcnqwwsr.s3.amazonaws.com/gradschool/s3fs-public/uploads/admissionsforms/umd_supplementary_application_enst.pdf)
- Supplementary Application Two (optional)
- Writing Sample (optional)
- Description of Research/Work Experience

Students seeking admission should have strong training in the basic sciences and mathematics. To be admitted with full admission status, a student must have completed a minimum of one semester of Calculus and a total of at least 20 credits in some combination of basic level Chemistry, Physics, Biology or Mathematics (beyond Calculus I). It is also helpful for applicants to have completed other courses in science and engineering. Applicants to the M.S. program must have earned a B.S. degree in a related field with an undergraduate cumulative GPA of 3.0 or higher. Applicants to the Ph.D. degree program must have earned an M.S. Degree in a closely related field. In special cases students may be admitted to a Ph.D. program without first completing an M.S. degree provided these students have:

1. an exceptional academic record and test scores; and
2. have demonstrated significant research experience during their B.S. program (such as completion of a research based honors thesis.)

Graduate Record Examination scores (GRE - General Test) are required of all applicants. International applicants must also submit TOEFL scores

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	December 15, 2021	October 6, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 15, 2021	September 22, 2021

RESOURCES AND LINKS:

Program Website: http://www.enst.umd.edu

Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Environmental Science and Technology, Doctor of Philosophy (Ph.D.) (p. 192)
- Environmental Science and Technology, Master of Science (M.S.) (p. 191)

Facilities and Special Resources

The Department has many well-equipped laboratories designed to carry out basic and applied research in Soil and Watershed Sciences, Ecological Technology Design, Wetland Science, and Ecosystem Health and Natural Resources Management. Laboratories are located on the College Park campus in H.J. Patterson Hall and the ANSC/AGEN Building. Greenhouse facilities are available on campus and a statewide network of research and education centers as well as our proximity to Chesapeake Bay provide access to a wide range of environmental conditions for research. Students have access to computer resources in the department and a comprehensive computer center located on campus. The University Libraries on campus and the National Agricultural Library located nearby, supplemented by the Library of Congress, make the library resources accessible to students among the best in the nation. Many ENST projects are conducted in cooperation with other departments on campus and with professionals at various scientific centers in the area. Scientists at the USDA-ARS, US Geological Survey, the National Academy of Sciences, NASA, National Institutes of Health, Department of Energy, Smithsonian, and National Park Service, US Fish & Wildlife Service, as well as other agencies, have cooperated with ENST faculty on various projects. Scientists from some of these agencies have adjunct appointments in the Department, have taught special courses at the University, and participate on graduate committees.

Epidemiology, Master of Public Health (M.P.H.)

Non-thesis only: 45 credits

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
EPIB611	Intermediate Epidemiology	3
EPIB651	Applied Regression Analysis	3
EPIB612	Epidemiologic Study Design	3
EPIB697	Public Health Data Management	3
EPIB778	Internship in Public Health	4
EPIB786	Capstone Project in Public Health	3

Electives	12
Total Credits	**45**

Epidemiology (EPDM)

Graduate Degree Program
College: Public Health

Abstract

Epidemiology is the study of the distribution and determinants of disease, and other health states in human populations. As the fundamental science of public health practice, epidemiology provides the conceptual and applied tools necessary for the study of public health problems. The MPH with a concentration in Epidemiology is a 45-credit professional degree that prepares graduates to work in public health services as practitioners, researchers, administrators, and consultants. A full-time student may complete our program in 2 years. Part-time students may take up to 4 years to complete the program. The majority of courses are offered in the evenings. In addition to coursework, all epidemiology master's students are required to complete a 240-hour internship and a capstone project.

Our proximity to the nation's capital offers students unparalleled opportunities for research experiences in public health, including placements at the National Institutes of Health, National Center for Health Statistics, Centers for Disease Control, Food and Drug Administration, the Maryland Department of Health and Mental Hygiene, and many other national, state, and local health agencies.

Contact

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Director of Graduate Studies
Department of Epidemiology and Biostatistics
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University of Maryland
College Park, MD 20742
Telephone: 301.405.2551
Email: xinhe@umd.edu

Website: http://sph.umd.edu/department/epib (http://sph.umd.edu/department/epib/)

Courses: EPIB (https://umd-curr.courseleaf.com/graduate/courses/epib/) SPHL (https://umd-curr.courseleaf.com/graduate/courses/sphl/)

Relationships: Biostatistics (BIOS) (p. 87) Epidemiology (EPID) (p. 195)

Admissions

GENERAL ADMISSION REQUIREMENTS

- Minimum 3.0 undergraduate GPA
- At least one undergraduate math course (M.S. applicants)
- Transcripts from all previous coursework
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose and objectives including career and educational goals, professional experience, and areas of interest

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS Application (https://sophas.org/): Applications for this School of Public Health Program must first be submitted through the Public Health application system, www.SOPHAS.org (https://sophas.org/). SPH applicants should only complete the UMD application after their SOPHAS application has been verified and you have been notified to complete the UMD application
- Graduate Record Examination (GRE) (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Dec. 17, 2021 (priority SOPHAS) / Jan. 14, 2022 (priority UMD Supplemental)
	May 6, 2022 (final SOPHAS) / June 3, 2022 (final UMD Supplemental)
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Dec. 17, 2021 (priority SOPHAS) / Jan.14, 2022 (priority UMD Supplemental)
	Feb. 11, 2022 (final SOPHAS) / Mar. 11, 2022 (final UMD Supplemental)

RESOURCES AND LINKS

Program Website: https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-epidemiology (https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-epidemiology/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Epidemiology, Master of Public Health (M.P.H.) (p. 193)

Facilities and Special Resources

The Department of Epidemiology and Biostatistics faculty includes individuals with multi-faceted interests in both epidemiology and biostatistics. Our faculty has multi-faceted interests and expertise in the epidemiology of infectious disease and chronic disease with particular focus in the areas of HIV/STIs, cancer, health disparities, cardiovascular disease, obesity/physical activity, and sexual and reproductive health. Additional areas of specialization include social and behavioral determinants of health, aging, cultural competency, and community-based interventions. Biostatistics faculty apply statistical techniques including survival and longitudinal analysis, computational statistics, statistical analysis of genomic and proteomic data, machine learning, neuroimaging statistics, (network) meta-analysis, missing data analysis, Bayesian hierarchical methods, and bioinformatics to analyze and interpret health data.

Epidemiology, Doctor of Philosophy (Ph.D.)

The PhD in Epidemiology requires a minimum of 64 credits beyond the master's degree in epidemiology or public health, including 12 credits of EPIB899. Students are also required to complete a minimum of 12 credits in a specialization cognate area, included in the 64 credit total. There is an additional 13 credits of prerequisite courses that must be completed during the doctoral program or prior to admission. Students who have not taken the prerequisites would complete a total of 77 credits.

Advance to Candidacy: In addition to the course requirements below, students admitted to the Ph.D. program advance to candidacy by passing a written comprehensive examination with an oral defense.

Post-Candidacy: After advancement to candidacy, students must complete a dissertation proposal and oral defense, followed by successful completion of the doctoral dissertation and oral defense.

Course	Title	Credits
Required courses:		
SPHL602	Foundations of Epidemiology and Biostatistics	4
EPIB611	Intermediate Epidemiology	3
EPIB651	Applied Regression Analysis	3
EPIB697	Public Health Data Management	3
SPHL600	Foundations of Public Health	3
EPIB612	Epidemiologic Study Design	3
EPIB620	Chronic Disease Epidemiology	3
or EPIB621	Infectious Disease Epidemiology	
SPHL612	Research Ethics	1
EPIB652	Categorical Data Analysis	3
EPIB653	Applied Survival Data Analysis	3
or EPIB655	Longitudinal Data Analysis	
EPIB710	Grantsmanship for Epidemiologic Research	3
EPIB740	Advanced Methods in Epidemiology	3
EPIB788	Critical Readings in Epidemiology and Biostatistics	3
EPIB798	Independent Study	3
Electives		12
Specialization Requirements		
Complete minimum of 12 credits in a specialization cognate area		12
Dissertation Research Requirement		
EPIB899	Doctoral Dissertation Research	12
Total Credits		**77**

Epidemiology (EPID)

Graduate Degree Program
College: Public Health

Abstract

The Department of Epidemiology and Biostatistics offers a Ph.D. program in Epidemiology. Students in the Ph.D. program in Epidemiology master core knowledge in epidemiologic and biostatistical methods related to the design, implementation and evaluation of public health studies surrounding psychosocial, behavioral, biological, and cultural factors.

Students may work with their advisor to design their own research specialization or they may apply to one of our two specializations:

1. Social Epidemiology or
2. Environmental Epidemiology.

Our students have full access to faculty who will guide you through all phases of the program to ensure your educational goals are met. Our Washington, DC area location provides unparalleled opportunities for research experiences in public health, including placements at the U.S. Department of Health and Human Services (e.g., National Institutes of Health, National Center for Health Statistics), Children's National Medical Center, the Maryland Department of Health and Mental Hygiene, and many other national, state, and local health agencies.

Financial Assistance

The Department offers a limited number of fellowships, and graduate teaching and research assistantships.

Contact

Xin He, Ph.D.
Director of Graduate Studies
Department of Epidemiology and Biostatistics
2234 School of Public Health Building
4200 Valley Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2551
Email: xinhe@umd.edu

Website: http://sph.umd.edu/department/epib **(**http://sph.umd.edu/department/epib/**)**

Courses: EPIB **(**https://umd-curr.courseleaf.com/graduate/courses/epib/**)** SPHL **(**https://umd-curr.courseleaf.com/graduate/courses/sphl/**)**

Relationships: Biostatistics (BIOS) **(**p. 87**)** Epidemiology (EPDM) **(**p. 194**)**

Admissions

GENERAL ADMISSION REQUIREMENTS

- Minimum 3.0 undergraduate GPA
- At least one undergraduate math course (M.S. applicants)
- Transcripts from all previous coursework
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose and objectives including career and educational goals, professional experience, and areas of interest

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS Application (https://sophas.org/): Applications for this School of Public Health Program must first be submitted through the Public Health application system, www.SOPHAS.org (https://sophas.org/). SPH applicants should only complete the UMD application after their SOPHAS application has been verified and you have been notified to complete the UMD application
- Graduate Record Examination (GRE) (required)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Nov. 12, 2021 (priority SOPHAS) / Dec. 10, 2021 (priority UMD Supplemental)
	Feb. 11, 2022 (final SOPHAS) / Mar. 11, 2022 (final UMD Supplemental)
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Nov. 12, 2021 (priority SOPHAS) / Dec. 10, 2021 (priority UMD Supplemental)
	Feb. 11, 2022 (final SOPHAS) / Mar. 11, 2022 (final UMD Supplemental)

RESOURCES AND LINKS

Program website: https://sph.umd.edu/academics/doctoral-degrees/phd-epidemiology (https://sph.umd.edu/academics/doctoral-degrees/phd-epidemiology/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Epidemiology, Doctor of Philosophy (Ph.D.) (p. 195)

Facilities and Special Resources

The Department of Epidemiology and Biostatistics faculty includes individuals with multi-faceted interests in both epidemiology and biostatistics. Our faculty have research interests and expertise in the epidemiology of infectious disease and chronic disease with particular focus in the areas of HIV/STIs, cancer, health disparities, cardiovascular disease, obesity/physical activity, and sexual and reproductive health. Additional areas of specialization include social and behavioral determinants of health, aging, cultural competency, and community-based interventions. Biostatistics faculty apply statistical techniques including survival and longitudinal analysis, computational statistics, statistical analysis of genomic and proteomic data, machine learning, neuroimaging statistics, (network) meta-analysis, missing data analysis, Bayesian hierarchical methods, and bioinformatics to analyze and interpret health data.

Ethnomusicology, Master of Arts (M.A.)

Students entering Spring 2020 or later:

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

The Master of Arts Degree (Thesis Option in Ethnomusicology, Music Education, Musicology or Music Theory; Non-Thesis Option in Ethnomusicology or Musicology requires a minimum of 30 credit hours. A grade of B- or better is required in all courses used to fulfill requirements for the degree. Six credits of thesis research or six credits of additional seminars are required. An oral defense of the thesis and a written comprehensive examination must be passed. Specific courses are required in each area of specialization.

Students must complete the following courses.

Course	Title	Credits
Required courses:		
MUSC677	Introduction to Ethnomusicology	3
MUSC646	Introduction to Musicology	3
MUSC632	The Anthropology of Music	3
MUSC633	Field Methods in Ethnomusicology	3
Other Studies in Music		12
Thesis or Non-Thesis Requirements		
Select one of the following:		6
Thesis:		
MUSC799	Master's Thesis Research	
Non-Thesis:		
Two seminar courses		
Total Credits		**30**

Ethnomusicology, Doctor of Philosophy (Ph.D.)

The Doctor of Philosophy degree requires the satisfactory completion of a body of coursework that, in the student's and the Graduate Advisor's judgement, prepares the student for the preliminary examination that leads to admission to candidacy. In addition to this pre-candidacy coursework, doctoral students are required to complete 12 credits of MUSC899. A grade of B- or better is required in all courses used to fulfill requirements for the degree. In consultation with the academic advisor, the student will nominate a dissertation committee. The student must submit a detailed dissertation prospectus to the members of the dissertation committee and the Graduate Director, and must be admitted to candidacy prior to the approval of the dissertation committee by the Graduate School. The dissertation must be successfully defended before the entire dissertation committee. The Doctor of Philosophy degree requires a dissertation.

Post-Candidacy: Complete at least 12 credits of MUSC899 doctoral dissertation research and successfully defend and submit an original dissertation.

Course	Title	Credits
Required courses:		
MUSC677	Introduction to Ethnomusicology	3
MUSC646	Introduction to Musicology	3
MUSC632	The Anthropology of Music	3
MUSC633	Field Methods in Ethnomusicology	3
MUSC679	Seminar in Ethnomusicology (two seminars, 3 cr. each)	6
Electives		3
Doctoral Dissertation Research Requirements		
MUSC899	Doctoral Dissertation Research	12
Total Credits		**33**

Ethnomusicology (MUET)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Music offers programs of study leading to the Master of Arts degree with areas of specialization in ethnomusicology, music history and literature (musicology), music education, and music theory; the Master of Music degree with areas in performance, composition, conducting, and music education; the Doctor of Philosophy degree with areas of specialization in ethnomusicology, musicology, music education, and music theory; and the Doctor of Musical Arts degree with areas of specialization in composition, performance, and conducting.

Financial Assistance

A number of competitive fellowships, graduate assistantships, teaching assistantships, opera assistantships, and orchestral assistantships are available. Preference for financial assistance will be given to those who have filed an application for admission to the University and the School of Music Supplemental Application by December 1 (for performance programs) and January 15 (for Music Education only) and have been officially admitted.

Contact

School of Music: The Academic Handbook is available online (http://www.music.umd.edu/current_students/handbooks/) and provides descriptive information, details of course requirements, examination procedures, and graduation requirements for the M.A., M.M., D.M.A., and Ph.D. degree programs. International students should read the information contained in the International Applicants section of the Graduate Admission Application.

Office of Music Admissions
2110 Clarice Smith Performing Arts Center
8270 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5560
Fax: 301.314.9504
Email: musicadmissions@umd.edu

Website: http://www.music.umd.edu

Courses: MUED (https://umd-curr.courseleaf.com/graduate/courses/mued/) MUSC (https://umd-curr.courseleaf.com/graduate/courses/musc/) MUSP (https://umd-curr.courseleaf.com/graduate/courses/musp/)

Admissions

General Requirements

- Statement of Purpose and Letters of Recommendation: The statement of purpose and three letters of recommendation will be required to be uploaded in the School of Music Application. The statement of purpose should also be uploaded into the Graduate School's application.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- School of Music Application (https://music.umd.edu/admissions/graduate/)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 1, 2021

RESOURCES AND LINKS:
Program Website: http://www.music.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Ethnomusicology, Doctor of Philosophy (Ph.D.) (p. 196)
- Ethnomusicology, Master of Arts (M.A.) (p. 196)

Facilities and Special Resources

With approximately 300 public performances each year—including student recitals and more than thirty ensembles—School of Music students have robust performance opportunities The School of Music also hosts numerous guest clinicians each year and presents the Renegade Series, which brings to campus some of the most visionary artists in our field. As one of the nation's leading public research universities, the University of Maryland provides a wealth of opportunities to learn from and collaborate with scholars in a variety of disciplines. The School of Music makes its home in the Clarice Smith Performing Arts Center, which serves as an inter-disciplinary laboratory for the arts. The building's six performance halls, the Michelle Smith Performing Arts Library, specialized rehearsal rooms, and classrooms provide students with all the resources needed to become twenty-first century artist-citizens. The Clarice's presenting arm provides School of Music students with the opportunity to collaborate and learn from internationally recognized artists and scholars. Recent artists-in-residence have included the St. Lawrence String Quartet, the Cappella Pratensis, Etienne Charles, Tine Thing Helseth, Jeremy Denk, and Dawn Upshaw. The Michelle Smith Performing Arts Library (MSPAL) ranks among the top twenty university music libraries in the United States, and it offers a variety of archives, special collections, and other research resources that give it international stature among scholars in a broad spectrum of music disciplines. The total music collection includes approximately 50,000 books, 150,000 scores, 140,000 recordings, and 4,500 linear feet of archival materials. The International Piano Archives at Maryland (IPAM) is the only institutional collection in existence devoted to historic piano performance. IPAM contains 40,000 recordings, 8,500 music scores, 2,500 books, and a collection of reproducing pianos with 8,000 piano rolls. To date, IPAM has acquired the collections of more than 40 eminent pianists. The MSPAL Special Collections in Performing Arts embrace a growing number of national and international music organization

archives representing music education, band history, solo and ensemble instrumental performance, music librarianship, and ethnomusicology. Materials in these archives include papers, music scores, recordings, books, magazines, photographs, and oral histories. MSPAL also features important archival and manuscript collections on music criticism and American music, the Charles Fowler Papers supporting the study of arts education, a significant Leopold Stokowski Collection, the Jacob Coopersmith Collection of Handeliana, the Radio Station WOR/Alfred Wallen stein Collection of 26,000 orchestral scores, and the performance parts of the Andre Kostelanetz Orchestra.

The surrounding DC-Baltimore region offers a host of community engagement opportunities. Our students can often be seen performing at major venues such as The John F. Kennedy Center for the Performing Arts, Strathmore Hall and the Phillips Collection. We also present at intimate community spaces such as Riversdale Mansion and the historical Greenbelt Theatre. Within a few miles of our home in College Park are research opportunities offered by Dumbarton Oaks, the Enoch Pratt Free Library of Baltimore, the Folger Shakespeare Library, the Library of Congress, the National Archives, the Smithsonian Institution, and many other specialized libraries.

Public Management (Executive), Master of Public Management (M.P.M.)

Non-thesis only: 30 credits required

The Executive Master of Public Management (EMPM/EXPM) program is for professionals with at least 5 years of policy and/or management experience. It consists of 30 credits of prescribed courses in the arts of public management and policy analysis. Students move through the program as members of a cohort at a designated site, either off-campus or on-campus on alternating weekends (Friday evenings/Saturday days).

Additional information on the curriculum and admissions policies of this program is available on the School's website.

Course	Title	Credits
Required courses:		
PLCY711	Public Management and Leadership	3
PLCY692	Leadership Principles and Practices	3
PLCY650	Moral Dimensions of Public Policy	3
PLCY670	Public Budgeting & Financial Management	3
Electives		18
Total Credits		**30**

Public Management (Executive) (EXPM)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

CONTACT

Office of Student Affairs
2101 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Courses: PLCY (https://umd-curr.courseleaf.com/graduate/courses/plcy/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Fall 2022: June 15, 2022	December 15, 2021
International Applicants		

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	March 15, 2022	September 30, 2021

RESOURCES AND LINKS:
Program Website: http://www.publicpolicy.umd.edu
Application Process: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Requirements

- Public Management (Executive), Master of Public Management (M.P.M.) (p. 198)

Family Science, Master of Science (M.S.)

Students interested in the M.S. degree should see the Couple and Family Therapy (p. 144) program page.

The CFT curriculum has three parts: didactic coursework, clinical practica, and supervised client contact. The minimum total credits required are 51 for the non-thesis option.

Supervised client contact begins in the student's first semester. Clinical students are required to gain 400 hours of face-to-face client contact, and 250 of these hours must be relational (with couples or families). The Center for Healthy Families, the couple and family therapy clinic operated by the Department, offers the opportunity to gain these hours. Clinical students receive 100 hours of supervision, both individual and group, for their client contact hours. Supervision in the Department's clinic is provided through a range of techniques including case discussion, one-way mirror observation, video review, co-therapy, and telephone consultation during live sessions. Students may choose to do some of their clinical work in a variety of available externship sites in the local area.

Family Science, Doctor of Philosophy (Ph.D.)

All Ph.D. students must complete foundation coursework required for a master's degree in Family Science. At the discretion of the Department's Graduate Committee, students entering the Ph.D. program with a master's degree in a related discipline may make up deficiencies in coursework through classes taken at the beginning of the program. Doctoral students must complete 52 credits beyond the master's degree.

Students admitted full-time to the Ph.D. program post-master's can complete this program within three years. Students with only a baccalaureate degree have the option of applying as a dual degree candidate (master's in Couple and Family Therapy, and doctorate in Family Science) requesting admission to both programs simultaneously.

Advance to Candidacy: In addition to the course requirements below, students must also complete a research internship paper and pass a qualifying exam in order to advance to candidacy.

Post-Candidacy: Complete at least 12 credits of FMSC899 Doctoral Dissertation Research and successfully defend and submit an original dissertation.

Course	Title	Credits
Required courses:		
FMSC760	Legal Issues & Families	3
FMSC606	Ethnic Families and Health Disparities	3
or FMSC745	Gender and Ethnicity in Family Therapy and Service Delivery	
FMSC660	Program Planning and Evaluation in Family Science	3
FMSC750	Family and Health Policy	3
SPHL600	Foundations of Public Health	3
FMSC780	Qualitative Methods in Family and Health Research	3
SPHL602	Foundations of Epidemiology and Biostatistics	4
EPIB651	Applied Regression Analysis	3
FMSC850	Maternal & Child Health Epidemiology	3
FMSC810	Theory in Family Systems and Family Health	3
FMSC689	Research Internship	3
Electives approved by Graduate Director		6
Doctoral Dissertation Research Requirements		
FMSC899	Doctoral Dissertation Research	12
Total Credits		**52**

Family Science (FMSC)

Graduate Degree Program
College: Public Health

Abstract

The Doctor of Philosophy (Ph.D.) program in Family Science provides an interdisciplinary, research-oriented approach to the discovery and application of knowledge about families. This exciting program examines both internal family processes and the dynamic interaction of families with the biological, psychological, social, political, and economic aspects of their environment. Graduates are prepared for a number of careers in the public, non-profit, and private sectors, including university teaching, research, family policy analysis, and administrative positions in human service programs.

The Ph.D. program adopts an ecological or systems approach to the study of families and the problems they face in today's society. The program of study provides doctoral students with a broad knowledge of family theory, research methodology, family policy, family programs, ethnic families, and major issues confronting contemporary families. Students also learn to design, implement, and evaluate culturally-sensitive interventions addressing family needs and to analyze the consequences of public/private policies on family well-being.

Students applying to the PhD program in Family Science should have a Master's degree in Family Science or a related behavioral or social science. From time to time, a student who seeks to combine clinical work with research is accepted into the Family Science Ph.D. program with only a Bachelor's degree, but they must also simultaneously apply to, and be accepted into the Master of Science (M.S.) degree in Couple and

Family Therapy. They then must complete this degree before beginning the Ph.D. program.

The Department of Family Science prepares students to describe, explain, and improve the quality of family life through applied research, education, therapy, human services, policy analysis, and advocacy. The approach is interdisciplinary, emphasizing individual, interpersonal, and social change. The program of study is based on a system or ecological paradigm, combining the perspectives of interrelated professional fields including family science, couple and family therapy, maternal and child health, family policy, behavioral science, and human services. Graduates are prepared for careers in the public, non-profit and private sectors, including university teaching, research, family policy analysis, and administrative positions in human service and public health programs.

Financial Assistance

Fellowships and Graduate Assistantships are available to students admitted into the Family Science Ph.D. program.

Contact

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Fax: 301.314.9161

Director of Graduate Studies
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Fax: 301.314.9161
Email: fmsc@umd.edu (https://academiccatalog.umd.edu/graduate/programs/family-science-fmsc/fmsc@umd.edu)

Website: http://www.sph.umd.edu

Courses: EPIB (https://umd-curr.courseleaf.com/graduate/courses/epib/) FMSC (https://umd-curr.courseleaf.com/graduate/courses/fmsc/) SPHL (https://umd-curr.courseleaf.com/graduate/courses/sphl/)

Relationships: Epidemiology (EPID) (p. 195) Psychology (PSYC) (p. 335) Sociology (SOCY) (p. 371)

Admissions

GENERAL REQUIREMENTS

- A Bachelor's degree
- Minimum 3.0 undergraduate GPA
- Transcripts from all previous coursework
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose

PROGRAM-SPECIFIC REQUIREMENTS

- Three letters of recommendation
- Resume or curriculum vitae
- One writing sample is required
- GRE scores are **not** required for this program. Please do not submit GRE test scores.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 3, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 3, 2021

RESOURCES AND LINKS:

Program Website: https://sph.umd.edu/academics/doctoral-degrees/phd-family-science (https://sph.umd.edu/academics/doctoral-degrees/phd-family-science/)
Application Process: https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Family Science, Doctor of Philosophy (Ph.D.) (p. 199)

Facilities and Special Resources

The University's close proximity to the nation's capital, the state capital in Annapolis, federal executive departments, and headquarters of national professional and public interest associations provide research and internship placements for studying family policy unmatched by any other graduate program in the discipline. The Washington-Baltimore metropolitan area offers rich opportunities for research on culturally and socioeconomically diverse families. The campus and department have excellent computer facilities. Students have ready access to the University's extensive library systems, as well as holdings from the Library of Congress, the National Institutes of Health, National Library of Medicine, National Archives, and many other library collections.

Center for Healthy Families: This Center is the training and research arm of the Couple and Family Therapy Program in the Department of Family Science. Departmental graduate students and faculty provide clinical and educational services to families from surrounding communities in this state-of-the-art facility. Master's and doctoral students use data collected at the Center for research projects.

Finance, Master of Finance (M.Fin.)

Non-thesis only: 30 credits required

The Master of Finance program provides students with the knowledge and skills necessary to succeed in the complex and networked world of finance.

All students must complete the following core courses and complete an additional 18 credits in one of the four specializations. Specializations include Corporate Finance, Asset Management, Risk Management, and General Finance.

Course	Title	Credits
Required courses:		
BUFN610	Financial Management	2
BUFN740	Capital Markets	2
or BUFN620	Capital Markets	
BUFN750	Valuation in Corporate Finance	2
or BUFN630	Valuation in Corporate Finance	
BUFN640	Financial Data Analytics	2
BUFN650	Machine Learning in Finance	2
BUFN761	Derivative Securities	2
or BUFN660	Derivative Securities	
Specialization courses		18
Total Credits		**30**

Finance (BMFN)

ABSTRACT

Maryland Smith's Master of Finance program gives you the advanced skills you'll need to launch an exciting career in finance.

- Explore key finance concepts and learn the latest industry technologies, such as Python and R
- Combine the theories you learn in class with projects and experiences that mirror what you'll do in the workplace
- Learn useful skills that can prepare you to take the Certified Financial Analyst (CFA) and the Financial Risk Manager (FRM) exams
- Gain career insights from Maryland Smith's finance career coaches and professors with years of relevant business experience

Financial Assistance

Financial aid is available to qualified students in the form of fellowships, graduate assistantships, and scholarships.

Contact

Program information is available online at http://www.rhsmith.umd.edu. Please contact us at:

MBA/MS Admissions
Telephone: 301.405.2559
Email: smithmasters@umd.edu

2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742

Website: http://www.rhsmith.umd.edu

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	May 24, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Finance, Master of Finance (M.Fin.) (p. 200)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database. The OCS also participates in regional and national career forums and job fairs.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Visit http://www.rhsmith.umd.edu for more information.

Fire Protection Engineering, Master of Science (M.S.)

Thesis only: 30 credits

The Master of Science (M.S.) degree program requires a research thesis and completion of a minimum of 24 credit hours of approved courses. Individual coursework plans are determined by the student, his or her advisor and the department. The M.S. research thesis should make a contribution to the advancement in the state-of-the-art of fire safety

science and/or engineering. In addition to a M.S. degree, the department also offers a Master of Engineering (M.Eng.) degree which requires 30 credit hours of approved courses in major and minor core areas. The M.Eng. degree does not include a research thesis. The department's degree requirements are given in detail in its graduate guide, see http://www.fpe.umd.edu/grad (http://www.fpe.umd.edu/grad/).

Students with a B.S. in UMD's FPE Program

Course	Title	Credits
Master's Thesis Research:		**6**
ENFP799	Master's Thesis Research	
Additional requirements:		**24**
Complete at least two core courses chosen in consultation with the Graduate Director		
Complete one course in mathematics chosen in consultation with the Graduate Director		
Complete three courses at the 600+ level, chosen in consultation with the Graduate Director		
Complete two courses at the 400+ level, chosen in consultation with the Graduate Director		
Total Credits		**30**

Students without a B.S. in UMD's FPE Program

Course	Title	Credits
Master's Thesis Research		**6**
ENFP799	Master's Thesis Research	
Required course:		**3**
ENFP651	Advanced Fire Dynamics	
Additional requirements		**21**
Complete at least two core courses chosen in consultation with the Graduate Director		
Complete one course in mathematics chosen in consultation with the Graduate Director		
Complete four courses at the 600+ level, chosen in consultation with the Graduate Director		
Total Credits		**30**

Fire Protection Engineering (ENFP)

Graduate Degree Program
College: Engineering

Abstract

The Department of Fire Protection Engineering (FPE) offers a world-class environment for advanced graduate study and research in the broad area of fire safety. The department offers a Master of Science (M.S) degree and a Master of Engineering (M.Eng.) degree. The mission of the FPE Department is to reduce the burden of fire losses on life and property by providing the highest quality of scientifically-based education, research, and outreach in fire protection engineering, and in fire-related safety, health and environmental issues. The FPE graduate program provides the unique interdisciplinary academic foundation and scholarly training needed to address complex engineering problems with emphasis on advancing the field of fire protection engineering.

The educational objectives of the FPE M.S. and M.Eng degree programs are to produce graduates who:

- Have the technical knowledge and skills needed to practice fire protection engineering locally, nationally and internationally in a variety of modern professional settings;
- Have the ability to understand and communicate societal, environmental, economic and safety implications of engineering decisions on the local and global communities;
- Are prepared to participate in the development and promotion of fire protection engineering and assume technical and/or business leadership positions.

Some additional educational objectives specific to the FPE M.S. degree program are to produce graduates who:

- Appreciate the importance of scientific research as a mechanism to strengthen the technical basis of fire protection engineering.
- Have the basic competencies needed to pursue advanced studies (e.g., Ph.D.) in fire protection engineering or related fields.

The program is designed to stimulate intellectual growth, increase the level of objective understanding of the physical world and further develop capabilities for analysis and synthesis in order to produce premier fire safety engineers and/or researchers.

Financial Assistance

The Department of Fire Protection Engineering offers several types of financial support through various research or teaching assistantships. Students are also encouraged to seek other external funding opportunities, for instance via University of Maryland work-study programs and internships available in fire laboratories and FPE consulting companies in the Baltimore-Washington area. For more details, see the department's graduate guide available at http://www.fpe.umd.edu/grad (http://www.fpe.umd.edu/grad/).

Contact

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Fax: 301.405.9383
Email: enfpgrad@deans.umd.edu

Website: http://www.enfp.umd.edu

Courses: ENFP

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume

The M.S. and M.Eng. programs are open to qualified students holding a Bachelor of Science (B.S.) degree in engineering, or a related field from an accredited institution. Applicants should have taken the following 4 prerequisite courses: differential equations, fluid mechanics, heat transfer, structural mechanics (or strength of materials). Applicants who have not completed all prerequisites may still be admitted on a provisional basis if they demonstrate satisfactory academic performance in a related field and/or relevant work experience; these applicants may then be asked to complete the prerequisite courses during their first semester at the University of Maryland. In most cases, the application process requires scores from the Graduate Record Examination (GRE).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	June 24, 2022	December 3, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	March 11, 2022	September 24, 2021

RESOURCES AND LINKS:
Program Website: http://www.enfp.umd.edu
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Fire Protection Engineering, Master of Science (M.S.) (p. 201)

Facilities and Special Resources

See http://www.fpe.umd.edu/research/labs (http://www.fpe.umd.edu/research/labs/) for a description of the experimental and computer laboratories available in the Department of Fire Protection Engineering.

Fire Protection Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Students must complete Group A courses before completing Group B courses.

Course	Title	Credits
Group A: [1]		
ENFP625	Advanced Fire Modeling	3
ENFP655	Smoke Control	3
ENFP651	Advanced Fire Dynamics	3
ENFP652	Fire Assessment Methods	3
ENFP653	Advanced Fire Supression	3
Group B courses (complete five):		15
ENFP613	Advanced Life Safety Analysis	
ENFP621	Analytical Procedures of Structural Fire Protection	
ENFP661	Forensic Fire Analysis	
ENFP662	Performance Based Design	
ENFP663	Advanced Fire Risk Modeling	
ENFP664	Advanced Industrial Fire Safety	
Total Credits		**30**

[1] Must be completed before completing Group B courses

Fire Protection Engineering (online) (ENGF)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Fire protection engineers are among the most sought-after professionals in the industry. Performance building codes and the international trend towards performance-based fire safety analysis and design approaches in construction have increased demand for fire protection engineers. The University of Maryland's fire protection engineering degree programs represent the Department of Fire Protection Engineering's commitment to preparing engineers for the challenges of this rapidly growing field. Fire protection engineering courses are available to explore basic processes of fire behavior, prediction of fire development, the combustion of materials and furnishings, the effects of fire on structures and the environment, smoke management, evacuation and tenability analysis and the law.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering

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4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENFP

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus/).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/application-process (https://mage.umd.edu/application-process/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Fire Protection Engineering, Master of Engineering (M.Eng.) (p. 203)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements		
ENFP627	Smoke Detection and Management	3
ENFP625	Advanced Fire Modeling	3
ENFP651	Advanced Fire Dynamics	3
ENFP653	Advanced Fire Supression	3
Total Credits		**12**

Fire Protection Engineering (online) (Z049)

Graduate Certificate Program
College: Engineering

ABSTRACT

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Fire protection engineers are among the most sought-after professionals in the industry. Performance building codes and the international trend towards performance-based fire safety analysis and design approaches in construction have increased demand for fire protection engineers. The University of Maryland's fire protection engineering degree programs represent the Department of Fire Protection Engineering's commitment to preparing engineers for the challenges of this rapidly growing field. Fire protection engineering courses are available to explore basic processes of fire behavior, prediction of fire development, the combustion of materials and furnishings, the effects of fire on structures and the environment, smoke management, evacuation and tenability analysis and the law.

FINANCIAL ASSISTANCE

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

CONTACT

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College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENFP

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 204)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Fire Protection Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

Students taking courses on campus for the Master of Engineering Degree work with an advisor to identify a course of study based on the student's professional interests. Students are required to complete 10 approved courses, including a minimum of six fire protection engineering core courses.

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Complete at least six of the following core courses:		18
ENFP415	Fire Dynamics	
ENFP425	Enclosure Fire Modeling	
ENFP611	Fire Induced Flows	
ENFP613	Advanced Life Safety Analysis	
ENFP620	Fire Dynamics Laboratory	
ENFP621	Analytical Procedures of Structural Fire Protection	
ENFP625	Advanced Fire Modeling	
ENFP627	Smoke Detection and Management	
Pre-approved elective options:		12
ENFP630	Diffusion Flames and Burning Rate Theory	
Total Credits		**30**

Fire Protection Engineering (PMFP)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Fire protection engineers are among the most sought-after professionals in the industry. Performance building codes and the international trend towards performance-based fire safety analysis and design approaches in construction have increased demand for fire protection engineers. The University of Maryland's fire protection engineering degree programs represent the Department of Fire Protection Engineering's commitment to preparing engineers for the challenges of this rapidly growing field. Fire protection engineering courses are available to explore basic processes of fire behavior, prediction of fire development, the combustion of materials and furnishings, the effects of fire on structures and the environment, smoke management, evacuation and tenability analysis and the law.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENFP

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:
Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Fire Protection Engineering, Master of Engineering (M.Eng.) (p. 205)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

This program is also offered 100% online. Please see Fire Protection Engineering (ENGF) for more information.

Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Core Requirements		
ENFP651	Advanced Fire Dynamics	3
Three additonal approved ENFP courses at the 600 level		9
Total Credits		**12**

Fire Protection Engineering (Z059)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Fire protection engineers are among the most sought-after professionals in the industry. Performance building codes and the international trend towards performance-based fire safety analysis and design approaches in construction have increased demand for fire protection engineers. The University of Maryland's fire protection engineering degree programs represent the Department of Fire Protection Engineering's commitment to preparing engineers for the challenges of this rapidly growing field. Fire protection engineering courses are available to explore basic processes of fire behavior, prediction of fire development, the combustion of materials and furnishings, the effects of fire on structures and the environment, smoke management, evacuation and tenability analysis and the law.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering
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Email: cgover@umd.edu

Website: https://mage.umd.edu/

Courses: ENFP

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 206)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

This program is also offered 100% online. Please see Fire Protection Engineering (Z049) for more information.

Food Safety Risk Assessment, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Food Safety Risk Assessment (Z027)

Graduate Certificate Program
College: Agriculture and Natural Resources

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: https://jifsan.umd.edu/

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.risk.jifsan.umd.edu

Requirements

- Food Safety Risk Assessment, Post-Baccalaureate Certificate (P.B.C.) (p. 207)

Modern French Studies, Doctor of Philosophy (Ph.D.)

All doctoral students are required to complete 24 credits beyond the M.A. in addition to 12 credits of FREN899. All Ph.D. students are required to demonstrate a sound reading knowledge of one other foreign language in addition to French. A student having a recognized degree or diploma in a subsidiary area such as Music, Economics, Political Science, etc, and who plans to make substantial use of this body of knowledge for the dissertation may be permitted, with the approval of the Graduate Programs Committee, to substitute such degree or diploma for the additional foreign language requirement.

Advance to Candidacy: In addition to course requirements, students must pass two Qualifying Examinations consisting of a two-part Comprehensive Examination. The first part is written, then oral, taken over two consecutive days by the end of the third semester in the PhD program. The second requirement is to defend a written Dissertation Prospectus (scheduled by the end of the fourth semester in the PhD program) before being advanced to candidacy.

Advance to Candidacy: Complete at least 12 credits of FREN899 and write and defend a dissertation that explores significant questions about French-language literature and culture, past or present, hexagonal or extra-hexagonal.

All requirements for the Ph.D. degree, except the dissertation, must be completed within five years of admission to the program. The dissertation must be completed no more than four years after advancement to candidacy. (See department website f (http://sllc.umd.edu/french/graduate/)or additional information)

Course	Title	Credits
History of Ideas course		3
Issues in Literature course		3
History of the French Language course		3
Remainder of coursework		15

Teaching Assistants must complete the following:

FREN709	College Teaching of French	
FREN611	The Structure of the French Language	
Dissertation Research Requirements		
FREN899	Doctoral Dissertation Research	12
Total Credits		**36**

Modern French Studies (FRMS)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Ph.D. in French Modern Studies encompasses the Renaissance to the present. The diversity of the Graduate Faculty makes it possible for students to specialize in a wide variety of areas in French language, literature, film, and culture. The Department is part of a larger School of Languages, Literatures and Cultures that encourages and facilitates interdisciplinary scholarship, particularly in Film Studies and in Cultural Studies. Through consortia arrangements with universities in the area, including George Washington University and Georgetown University, students may augment their programs with courses otherwise unavailable at the University of Maryland.

Financial Assistance

Graduate applicants can request to be considered for Teaching Assistantships and Graduate Fellowships. Graduate Teaching Assistantships carry ten-month stipends for a total of four years (provided that the student remains in good standing), plus remission of all fees (10 credits) other than those for registration and health facilities.

Contact

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Fax: 301.314.9752
Email: sbenharr@umd.edu

Website: http://www.sllc.umd.edu

Courses: FREN

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Two Writing Samples (both in French)

All applicants are automatically considered for departmental Fellowships and Teaching Assistantships.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 14, 2022	August 19, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 14, 2022	September 30, 2021

RESOURCES AND LINKS:
Program Website: sllc.umd.edu (http://www.sllc.umd.edu)
Admissions Information: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Modern French Studies, Doctor of Philosophy (Ph.D.) (p. 208)

Facilities and Special Resources

With a total student enrollment of over 35,000, the University of Maryland is supported in its academic endeavors by the University Libraries, a system of eight libraries and more than three million volumes. Other area research facilities include two of the worlds outstanding libraries: the Library of Congress and the Folger Library, both of which have extensive holdings in French. The School of Languages, Literatures and Cultures, the Women's Studies Program, and the David C. Driskell Center For The Study of The Visual Arts and Culture of African Americans and The African Diaspora, among other campus units, offer seminars, lectures, and symposia on a wide variety of topics relevant to graduate students in French.

French Language and Literature, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

The M.A. without thesis requires a minimum of 30 credits, of which at least 18 must be selected from courses numbered 600 or above. In lieu of a thesis, students must present a Qualifying Paper of between 25 and 30 pages in length as evidence of their ability to do independent research. The M.A. with thesis requires a minimum of 24 credits, of which not less than 12 must be selected from courses numbered 600 or above. A further six credits (thesis research/FREN799) are required. The M.A. thesis committee consists of 2 faculty members in addition to the student's thesis director, who serves as chairperson. There is an oral examination on the thesis, which should be a minimum of 80 pages in length. (See department website (http://sllc.umd.edu/french/) for complete information)

Teaching Assistant Requirement
All Teaching Assistants are required to take SLLC601 for one credit. This course counts towards the total credits required.

Course	Title	Credits
Theory or history of ideas course		3
French linguistics course		3
Three culture/literature courses from three different periods		9
Thesis or Non-thesis options:		**15**
Thesis Option:		
French studies courses		
FREN799	Master's Thesis Research	
Non-thesis option:		
French studies courses		
Qualifying Paper		
Total Credits		**30**

French Language and Literature (FRIT)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of French and Italian prepares students for the Master of Arts (FRIT) and Doctor of Philosophy (FRMS) degrees in French language, literature and culture. The research interests of the graduate faculty span the Renaissance to the present. For the doctoral program, consult the graduate catalog under FRMS, "Modern French Studies."

Financial Assistance

Graduate applicants can request to be considered for Teaching Assistantships and Graduate Fellowships. Graduate Teaching Assistantships carry ten-month stipends for two years, plus remission of all fees (10 credits) other than those for registration and health facilities.

Contact

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Telephone: 301.405.4029
Fax: 301.314.9752
Email: sbenharr@umd.edu

Website: http://www.sllc.umd.edu

Courses: FREN

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample

All applicants are automatically considered for departmental Fellowships and Teaching Assistantships.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 14, 2022	August 19, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 14, 2022	August 19, 2021

RESOURCES AND LINKS:
Program Website: sllc.umd.edu (http://www.sllc.umd.edu)
Admissions Information: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- French Language and Literature, Master of Arts (M.A.) (p. 209)

Facilities and Special Resources

With a total student enrollment of over 35,000, the University of Maryland is supported in its academic endeavors by the University Libraries, a system of eight libraries and more than three million volumes. Other area research facilities include two of the world's outstanding libraries: the Library of Congress and the Folger Library, both of which have extensive holdings in French. The School of Languages, Literatures and Cultures, the Women's Studies Program, and the David C. Driskell Center For The Study of The Visual Arts and Culture of African Americans and The African Diaspora, among other campus units, offer seminars, lectures, and symposia on a wide variety of topics relevant to graduate students in French.

Geographical Sciences, Master of Science (M.S.)

Non-thesis only: 30 credits required

Students are also required to complete a scholarly project.

The combined BS/MS degree is only granted to students who have successfully completed the 120 hours of undergraduate coursework, 30 hours of graduate coursework, and a scholarly paper. For more information in the course sequencing and credits applicable to both the undergraduate and graduate degrees, see the Department's website: http://geog.umd.edu/combined-bsms-program (http://geog.umd.edu/combined-bsms-program/).

Course	Title	Credits
Required courses:		
GEOG601	The Nature and Practice of Science	3
GEOG606	Quantitative Spatial Analysis	3
GEOG789	Independent Readings	6
GEOG798	Selected Topics in Geography: Seminar Series	3
GEOG6xx: Technical Elective		3
GEOG6xx: Physical Elective		3
GEOG6xx: Human Elective		3
GEOG6xx: Electives		6
Total Credits		**30**

Geographical Sciences, Doctor of Philosophy (Ph.D.)

For those entering with a Master's degree in Geography, the PhD should be completed withing 4 years; For those entering with a Bachelor's or without a Geography background, the PhD should be completed within 5 years. Part-time study takes longer, but at least 1 year full-time attendance is required. Students entering with a B.A. or without a Geography background will take one course each in the following areas: Human, Physical, and Methods. See the PhD Handbook (https://geog.umd.edu/graduate/phdhandbooks/) for further details.

Students without a Geography background should complete an additional 9 credits in the following areas:

- Environmental and Biological Aspects of Earth Systems Science,
- Human Dimensions of Global Change, and
- Geospatial Information Sciences.

Advance to Candidacy: In addition to course requirements, students must successfully pass an annual faculty review, a portfolio assessment, and successfully defend a dissertation prospectus.

Post-Candidacy: In addition to annual faculty reviews, students complete at least 12 credits of GEOG899 Doctoral Dissertation Research as well as successfully defend and submit an original dissertation.

Course	Title	Credits
Required courses:		
GEOG601	The Nature and Practice of Science	3
GEOG606	Quantitative Spatial Analysis	3
or GEOG636	Qualitative Methods in Geography	
GEOG608	Comprehensive Portfolio Assessment Summary	1-3
GEOG788	Selected Topics in Geography (GEOG788D - Selected Topics in Geography)	3
GEOG798	Selected Topics in Geography: Seminar Series	2
Pass a portfolio assessment		
Dissertation Research Requirements		
GEOG899	Doctoral Dissertation Research	12
Total Credits		**24-26**

Geographical Sciences (GEOG)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Department of Geographical Sciences offers graduate study leading to the Doctor of Philosophy, Master of Professional Studies in Geospatial Information Sciences, and five year, combined Bachelors of Science and Masters of Science in Geographical Sciences degrees.

The specific research specializations represented by the faculty include:

Human Dimensions of Global Change

Coupled Human and Natural Systems. The Department's ultimate research goal is to advance an integrated understanding of the coupled Earth system including spatially distributed human processes. Our research addresses both fundamental and applied issues in coupled human and natural systems, such as population, socio-economic development, consumption and production, poverty, climate impacts and adaptation, vulnerability and mitigation, as well as the examination of policy options and trade-offs on sustainability. Our scientists investigate both the human socio-economic system and the climate system, and their linkages.

Land Cover, Land Use Change

Land cover and land-use change is a key interface between human and natural systems. Our scientists are world leaders in the remote sensing of land-cover changes. This information is actively combined with human socio-economic data to study past land cover and land use change and to inform advanced modeling of spatially-explicit future scenarios. These methods are actively being used to simultaneously address social, economic, carbon, climate, biodiversity and other aspects of land-use changes. We develop agricultural monitoring systems and look at societal impacts, adaptions and vulnerability to fire, droughts, floods, desertification, and other catastrophic events.

Geospatial Information Sciences and Remote Sensing

Collecting and interpreting geospatial data is central to everything we do as geographers, whether on computers or in the field. From local events to multi-scale processes, our faculty are developing and applying advanced remote sensing capabilities and GI Science that will help us to develop the next generation of GI technologies and understanding of the world's geography. Our strengths include advanced computer modeling, scientific and geographic visualization, sensor calibration and design, image processing, geocomputing, spatial statistics, and semantic learning.

Carbon, Vegetation Dynamics and Landscape-scale Processes

The department carries out a broad array of research focused on monitoring vegetation dynamics, with a particular focus on mapping and studying human and natural disturbances and their landscape-scale impacts, as well as changes to the earth surface as a result of climate variability. This research involves integration of field-based research with remotely-sensed observations to address key scientific uncertainties. Alterations to the global carbon cycle are changing atmospheric composition and climate with implications for human well-being and a particular focus of our research is on monitoring and modeling the terrestrial carbon cycle with unprecedented sophistication and resolution.

The Department contains several specialized groups, including the Global Land Cover Facility, as well as several smaller groupings of research interests. The Department also has close ties with cross-campus research initiatives, including the Earth Systems Science Interdisciplinary Center (ESSIC) and the Joint Global Change Research Institute (JGCRI). ESSIC is an initiative that brings together the Departments of Geography, Geology and Atmosphere and Ocean Science in a Research Institute to further encourage interdisciplinary studies to address contemporary questions in Earth Systems Science. JCGRI is a collaboration between the University of Maryland and the Pacific Northwest National Laboratory and is dedicated to understanding the problems of global climate change and their potential solutions.

Financial Assistance

Teaching Assistantships, Research Assistantships, and various Fellowships are available. Salary is for 9.5 months per year. Assistants work 20 hours per week. Fellowship recipients have no work assignment. Depending upon resources, the department will provide up to four years of funding, provided the student meets the department's benchmarks (see the PhD Handbook (https://geog.umd.edu/graduate/phdhandbooks/)). Applications are made on the University Graduate Admission Application and further information about Financial Aid is given in the Application. Note, residents of certain Southern States without equivalent Geography graduate programs may be eligible to receive tuition at the lower, in-state fee rates.

Funding is not available for students in the combined BS/MS program.

Fellowships in Support of Diversity and Inclusion (https://geog.umd.edu/graduate/assistantships/) (optional)

Contact

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Courses: GEOG

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationgeog2021.pdf)
- Supplementary Application Two (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationgeog2.pdf)
- Writing Sample
- Writing Sample Two (optional)

- Description of Research/Work Experience
- Publications/Presentations (optional)

The Department offers courses of study leading to the Ph.D. degree and the MPS (masters in professional studies in geospatial information sciences). The MPS program is administered separately and has different admission deadlines and requirements than the Ph.D. program. See the MPS GIS Program (https://geog.umd.edu/landing/Graduate/). The Department no longer offers an M.A. option. All students are admitted directly to the Ph.D. program.

Ph.D. Program

The Department admits students to our doctoral program that have already completed a masters degree and exceptionally well qualified students who have only completed a bachelor's degree. Admitted students are required to either possess or shall develop a strong foundation in the discipline of Geography. Admission to the Ph.D. program is not limited to students with a Geography degree. Those with degrees in related disciplines such as environmental, physical or biological sciences, anthropology, economics, history and social science are encouraged to apply but may be required to undertake additional background study. Some knowledge of data processing and statistics is necessary for all applicants.

Applicants proposed program of study must clearly draw on the research strengths of existing faculty members. All applicants are strongly encouraged to contact individual faculty members (in person, by phone, or by email) to discuss their research interests and to identify potential advisors, as they will need a faculty to sponsor them for admission.

In general, the Department admits between 10-15 students each year into the Ph.D. program. Virtually all students accepted are fully-funded through assistantships and fellowships. While there is no longer a formal M.S. program, a terminal masters degree may be received for qualified students who are unable to complete the Ph.D. program.

Combined BS/MS Program

The Masters of Science degree is only earned through the Department's combined five year BS/MS program. The combined BS/MS program enables some of the better performing students pursuing an undergraduate Geographical Sciences major to earn both their BS and their MS in five years by counting up to 8 credits of their Geographical Sciences graduate courses towards both degrees, thus significantly reducing both the time and cost of earning both degrees.

Most students apply to the program at the end of their Junior year to begin graduate courses and be part of the program as of their Senior year. Admission into the program is strongly competitive. Students will be admitted with an undergraduate degree in Geographical Sciences, including those with an ENSP concentration in Geographical Sciences. Minimum requirements are: 3.5 GPA overall, three letters of recommendation, and a statement of research.

Applicants' proposed statement of research must clearly align with the research strengths of existing faculty members. All applicants are strongly encouraged to contact individual faculty members (in person, by phone, or by email) to discuss their research interests and to identify potential advisors, as they will need a faculty member to sponsor them for admission.

In general, the Department admits between 5-10 students each year into the combined BS/MS program. There is no Departmental funding available.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Fall 2022: December 15, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Fall 2022: December 17, 2021

RESOURCES AND LINKS:
Program Website: http://www.geog.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Geographical Sciences, Doctor of Philosophy (Ph.D.) (p. 210)
- Geographical Sciences, Master of Science (M.S.) (p. 210)

Facilities and Special Resources

The Washington, D.C. metropolitan area is an exceptional location in which to pursue geographic research. Many national and international agencies are within a short distance of the campus, including the NASA Goddard Space Flight Center, the USDA Beltsville Agricultural Research Center, the National Archives, Bureau of the Census, National Institutes of Health, USGS, National Geospatial Imaging Agency, Smithsonian Institution, and NOAA. International and non-governmental agencies are located within easy reach, including the National Geographic Society, the Nature Conservancy, World Wildlife Fund, World Bank, and many others. Corporations, businesses and nonprofit organizations that use geographical applications are also well represented. Libraries on campus and nearby are unrivaled elsewhere in the world. The University is also located in a region of extraordinary geographic diversity, including two major urban centers (Baltimore and Washington, D.C.), and the superb, continuous section from the Appalachian mountains, through the Piedmont, Coastal Plain, and Chesapeake Bay to the Atlantic Coast.

Many opportunities exist for students to participate in externally funded research projects. Graduate students find these research programs a rich source of ideas for dissertations as well as providing opportunities to join projects as paid research assistants and, often, identifying openings for employment on completion of their studies.

The Department is housed in over 35,000 sq. ft. on the main College Park campus. Teaching laboratories include facilities for cartography, GIS, and the Turner laboratories dedicated to computer-based instruction, while other facilities needed for virtually any type of investigation are available through collaborations with other departments. There are two primary computer environments, namely PC and UNIX, with over 100 machines dedicated to teaching and graduate research. The research laboratories support UNIX, Linux, and high-end PC machines, including very high performance processors and peripherals and large volume RAID arrays. There are a large number of printers, magnetic disk farms, tape libraries, etc. An extensive range of software is available, including satellite data processing, image analysis, and ESRI GIS packages. Field research, remote sensing, global positioning systems, and other types of equipment are available.

Geology, Master of Science (M.S.)

Thesis only: 30 credits

Students are required to complete 30 credits, including at least 18 credits from the Department of Geology and at least 12 credits at the 600 level or higher.

The Department of Geology offers a Master of Science degree. There is no single prescribed curriculum. Although 24 credit hours of course work and 6 credit hours of thesis research are required, the entire course of study is individually developed for each student by his/her graduate program committee as approved by the Director of Graduate Studies. The M.S. degree is awarded following the successful completion of the course requirements, defense of a proposal, submission of a satisfactory thesis, and an oral defense of the thesis. The M.S. normally requires two years of work.

Course	Title	Credits
Coursework including at least 18 credits from the Department of Geology and at least 12 credits at the 600 level or higher		24
GEOL799	Master's Thesis Research	6
Total Credits		**30**

Geology, Doctor of Philosophy (Ph.D.)

Advance to Candidacy: In addition to satisfactory completion of course requirements, students must pass an oral exam, as well as successfully defend a research proposal.

Post-Candidacy: Students complete at least 12 credits of GEOL899 Doctoral Dissertation Research as well as successfully defend and submit an original dissertation.

Entering with an M.S. Degree

Course	Title	Credits
Select 12 credits of coursework with at least nine credits at the 600 level or above.		12
Dissertation Research Requirement		
GEOL899	Doctoral Dissertation Research	12
Total Credits		**24**

Entering without an M.S. Degree

Course	Title	Credits
Select 30 credits of coursework with at least 21 credits at the 600 level or above.		30
Dissertation Research Requirement		
GEOL899	Doctoral Dissertation Research	12
Total Credits		**42**

Geology (GEOL)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Department of Geology offers programs leading to the M.S. and Ph.D. degrees. On a full time basis, the M.S. normally requires two to three years of work, which includes courses, the completion of an M.S. research thesis, and an oral defense of the thesis. On a full time basis, the Ph.D. commonly requires three to four years of work, if conducted after the completion of an M.S. program, or four to five years from the time of admission if pursued directly from the Bachelor level. The Ph.D. program normally includes course work, a qualifying examination and proposal defense, a dissertation, and an oral defense and examination of the dissertation.

Our students are required to engage in independent and original research under a mentoring program that promotes creative thinking. This is most commonly achieved via the collaboration between students and faculty in ongoing research programs. Geology is concerned with the Earth, its origin and evolution and the origin of life, and the processes by which Earth's atmosphere, surface and interior have been and continue to be modified. To pursue these topics we have developed research strengths in four themes: Geochemistry, which involves investigations of low- to high-temperature processes operating from Earth's surface to it's core and within the Solar System; Solid Earth Science, which is the study of the minerals, rocks, and structures that constitute Earth, and the tectonic and other processes by which they are formed and altered; Surficial Processes and Environments, which involves the study of active and past fluxes (and reservoirs) of water, dissolved components, and sediment on Earth's surface and the interactions of these fluxes with the biosphere and atmosphere; and, Geophysics, which includes investigations of Earth's interior structure and dynamics, as well as planetary physics. These areas are not mutually exclusive, and students are encouraged to develop a program that suits their interests. Developing areas within the Department include planetary geology and forensics.

Although students will choose an advisor within the Department of Geology, they may also wish to take advantage of research opportunities provided by collaboration with other departments on campus, such as Mathematics, particularly the Applied Mathematics and Scientific Computation Program (AMSC), Atmospheric and Oceanic Science, Physics, Geography, and Chemistry, as well as other institutions in the area including the Smithsonian Institution, United States Geological Survey, NASA, Department of Terrestrial Magnetism, Geophysical Lab and National Institute of Standards and Technology. The Earth System Science Interdisciplinary Center is a collaborative venture between the Departments of Geography, Geology and Atmospheric and Ocean Science on Campus, and the Earth Sciences Directorate at NASA Goddard. This wealth of in-house and collaborative resources positions our graduate students with an unmatched spectrum of opportunities and gives them access to a strong multi-disciplinary program of international stature.

Our current student demographics are diverse, with an approximate 50:50 mix of male and female students of which 10-20% are minority students. Approximately 60% of our graduate students are Ph.D. candidates (the remaining are M.S. students), and some of the M.S. students will petition to become Ph.D. candidates following the successful completion of their M.S. degree program. Other M.S. candidates are focused solely on the M.S. degree, which is the commonly held degree for practicing professionals in government and industry.

Our graduate students benefit from the opportunities of working within an advanced graduate program. Our graduates go on to distinguished post-doc, research and applied positions in academic, government and industrial settings. We proudly acknowledge having placed our students into prestigious post-doc positions and government laboratories and we highlight their publications (see https://www.geol.umd.edu/graduate/gradpubs.php), presentations at national and international meetings (see https://www.geol.umd.edu/graduate/gradpresentations.php) and awards (see https://www.geol.umd.edu/graduate/gradfunding.php).

Financial Assistance

Graduate students are eligible for Departmental teaching assistantships, Graduate School fellowships and grant-supported fellowships and research assistantships. In addition, some curatorial, library and other part-time work is sometimes available.

Contact

See the Department of Geology Web page at URL https://www.geol.umd.edu (http://www.geol.umd.edu) for additional information. The Department's Graduate Studies in Geological Sciences also provides additional information on the requirements, examinations, faculty research interests and publications, research facilities and financial aid. Copies are available from:

Graduate Coordinator
1118 Geology Building
8000 Regents Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4065
Email: grad-sec@umd.edu

Website: https://www.geol.umd.edu **(**http://www.geol.umd.edu**)**

Courses: GEOL **(**https://umd-curr.courseleaf.com/graduate/courses/geol/**)**

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)

Qualified students with a B.S. degree in geology, physics, mathematics, chemistry, biology, engineering or other related sciences are invited to apply for admission to the graduate programs. Our graduate degree program in geophysics welcomes students with undergraduate degrees in physics and or astronomy having little to no background in geology. Coursework expectations for students applying to the program is at least a year of calculus, a semester of physics for science majors, and for those in the in geology and geochemistry track a year of chemistry or its equivalent.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 5, 2022	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 5, 2022	N/A

RESOURCES AND LINKS:
Program Website: http://www.geol.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Geology, Doctor of Philosophy (Ph.D.) (p. 213)
- Geology, Master of Science (M.S.) (p. 213)

Facilities and Special Resources

The Department maintains a suite of state-of-the-art facilities and equipment for research, including: three solid source mass spectrometers, six gas source mass spectrometers, with inlet devices for inorganic and organic isotope analyses, single and multicollector inductively-coupled plasma mass spectrometers (ICP-MS), three UV lasers for in situ analyses with gas-source and plasma mass spectrometer, two chemical clean labs, with ion chromatographic facilities, JEOL 8900 superprobe with an Oxford instrument mini-cathodoluminescence detector, Scanning and Transmission Electron Microscopes, color image analysis system, fluid inclusion stage, high temperature and high pressure equipment for dry or hydrothermal experiments, diamond anvil cell facilities, including laser heating and external heating, two triaxial deformation apparatii with flow through capacity and acoustic emission recording, flame and graphite furnace atomic absorption equipment, spectrophotometers, HPLC with fluorescence detector, UV lamps and monochronometer for photochemistry, anoxic chamber, Geographic Information Systems (GIS) computational laboratory, electromagnetic and acoustic doppler velocity meters, laboratory and field hydrogeology equipment, campus drill rig, microstructures and fabrics analysis instruments, research microscopes with reflectance capabilities, rock preparation and mineral separation laboratories, computer network with direct access to supercomputer facilities, nitrogen Permeameter 400, helium Porosimeter 300, Solaris Impedance Meters.

Further information is found at the following URL https://www.geol.umd.edu/graduate/index.php (https://www.geol.umd.edu/graduate/)

Geospatial Information Sciences, Master of Professional Studies (M.P.S.)

Non-thesis only (project required): 31 credits total

Students choosing the Master of Professional Studies degree track need to complete 31 credit hours of approved coursework with an average grade of B.

Course	Title	Credits
Required courses:		
GEOG651	Spatial Statistics	3
GEOG652	Digital Image Processing and Analysis	3
GEOG653	Spatial Analysis	3

GEOG656	Advanced Programming for GIS	3
GEOG677	Web GIS	3
GEOG657	Web Programming	3
GEOG795	Professional Practices Seminar	1
GEOG797	Professional Project	3
Select three of the following:		9
GEOG654	GIS and Spatial Modeling	
GEOG655	Spatial Database System	
GEOG650	MOBILE GIS	
GEOG796	GIS Project Management	
GEOG660	Advanced Remote Sensing Using Lidar	
GEOG670	Open Source GIS	
Total Credits		**31**

Geospatial Information Sciences (MPGC)

Please see the following catalog page: https://academiccatalog.umd.edu/graduate/programs/geospatial-information-sciences-geic/

Geospatial Information Sciences, Master of Professional Studies (M.P.S.)

Non-thesis only (project required): 31 credits total

Students choosing the Master of Professional Studies degree track need to complete 31 credit hours of approved coursework with an average grade of B.

Course	Title	Credits
Required courses:		
GEOG651	Spatial Statistics	3
GEOG652	Digital Image Processing and Analysis	3
GEOG653	Spatial Analysis	3
GEOG656	Advanced Programming for GIS	3
GEOG677	Web GIS	3
GEOG657	Web Programming	3
GEOG795	Professional Practices Seminar	1
GEOG797	Professional Project	3
Select three of the following:		9
GEOG661	Fundamentals of Geospatial Intelligence	
GEOG663	Big Data Analytics	
GEOG654	GIS and Spatial Modeling	
GEOG650	MOBILE GIS	
GEOG660	Advanced Remote Sensing Using Lidar	
GEOG655	Spatial Database System	
GEOG670	Open Source GIS	
or GEOG788A	Course GEOG788A Not Found	
GEOG796	GIS Project Management	
Total Credits		**31**

Geospatial Information Sciences (MPGS)

The Master of Professional Studies in Geospatial Information Sciences is no longer offered. Please see the Master of Science in Geospatial Information Sciences program page (https://academiccatalog.umd.edu/graduate/programs/geospatial-information-sciences-geis/).

Geospatial Information Sciences, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Students choosing the Graduate Certificate track need to complete 12 credit hours of approved coursework with an average grade of B.

Course	Title	Credits
Required courses:		
GEOG651	Spatial Statistics	3
GEOG653	Spatial Analysis	3
GEOG656	Advanced Programming for GIS	3
Select one of the following:		3
GEOG655	Spatial Database System	
GEOG657	Web Programming	
GEOG654	GIS and Spatial Modeling	
GEOG650	MOBILE GIS	
GEOG661	Fundamentals of Geospatial Intelligence	
GEOG663	Big Data Analytics	
Total Credits		**12**

Geospatial Information Sciences (Z035)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The **Master of Science in Geospatial Information Sciences Program** is dedicated to providing the most up-to-date education on geospatial technology, theory and applications. The courses cover spatial analysis, statistics, programming, databases, modeling, remote sensing, Internet GIS, Mobile GIS, and Open Source GIS. Both **MS degree (30 Credits)** and **Graduate Certificate (12 Credits)** in GIS are offered.

Financial Assistance

There are no fellowships available in this program. However, there are potential Teaching Assistantships available depending on the student's qualification.

Contacts

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University of Maryland
College Park, MD 20742
Telephone: 301.314.1883
Email: kbergery@umd.edu

Website: http:// (http://www.geog.umd.edu/gis/)geospatial.umd.edu (http://geospatial.umd.edu)

Courses: GEOG

Relationships: Geographical Sciences (GEOG) (p. 210) Geospatial Information Sciences (GEIS) (p. 215)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationgeisz035gisoz134.pdf)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

The Graduate School requires all admitted graduate students to have a baccalaureate degree from a regionally accredited college or university in the United States, or the equivalent of a baccalaureate degree in another country. A GPA of 3.0 is normally required for admission into this program. Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis.

Applicants with foreign credentials must submit academic records in the original language with literal English translations.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Fall 2021: 28 July Fall 2022: July 28, 2022	Spring 2022: February 8, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.geog.umd.edu/gis (http://www.geog.umd.edu/gis/)

Requirements

- Geospatial Information Sciences, Post-Baccalaureate Certificate (P.B.C.) (p. 215)

Geospatial Intelligence, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits required

Please contact the department for specific course information

The MPS GEOINT program encompasses a 30-credit (10 units of 3-credit courses) course structure comprising five core courses and a selection of five courses among electives. Students are required to accomplish an averge grade of B to receive a degree.

Course	Title	Credits
Select five of the following core courses:		15
GEOG664	GEOINT Systems and Platforms	
GEOG656	Advanced Programming for GIS	
GEOG661	Fundamentals of Geospatial Intelligence	
GEOG662	Advances in GIS and Remote Sensing	
GEOG695	Course GEOG695 Not Found	
GEOG665	Algorithms for Geospatial Intelligence Analysis	
GEOG697	Capstone Project	
Select five of the following electives:		15
GEOG680	GEOINT Networks	
GEOG682	Open Source Intelligence	
GEOG683	Hazards and Emergency Management	
GEOG663	Big Data Analytics	
GEOG651	Spatial Statistics	
GEOG660	Advanced Remote Sensing Using Lidar	
GEOG657	Web Programming	
GEOG684	Course GEOG684 Not Found	
GEOG685	Course GEOG685 Not Found	
GEOG687	Course GEOG687 Not Found	
GEOG694	Computerized Map Projections and Transformations	
GEOG690	Course GEOG690 Not Found	
GEOG686	Mobile GIS and Geocomputing	
GEOG691	Course GEOG691 Not Found	
GEOG692	Course GEOG692 Not Found	
GEOG693	Independent Study in GEOINT	
Total Credits		**30**

Geospatial Intelligence (MPGI)

The Master of Professional Studies in Geospatial Intelligence is no longer offered.Please see the Master of Science in Geospatial Intelligence program page.

Geospatial Intelligence, Post-Baccalaureate Certificate (P.B.C.)

15 credits required

Course	Title	Credits
Complete the following core courses		
GEOG661	Fundamentals of Geospatial Intelligence	3
GEOG662	Advances in GIS and Remote Sensing	3
GEOG697	Capstone Project	3
Complete six credits of electives		6
GEOG646	Programming for GIS	
GEOG656	Advanced Programming for GIS	
GEOG660	Advanced Remote Sensing Using Lidar	
GEOG663	Big Data Analytics	
GEOG664	GEOINT Systems and Platforms	
GEOG665	Algorithms for Geospatial Intelligence Analysis	
GEOG666	Drones for Data Collection (Drone for Data Collection) VPAC pending	
GEOG677	Web GIS	
GEOG680	GEOINT Networks	
GEOG682	Open Source Intelligence	
GEOG683	Hazards and Emergency Management	
GEOG686	Mobile GIS and Geocomputing	
GEOG684	Course GEOG684 Not Found (Image Analysis and Geovisualization) Being developed	
GEOG685	Course GEOG685 Not Found (Machine Learning and Data Mining) Being developed	
GEOG687	Course GEOG687 Not Found (Geospatial Intelligence for Security) Being developed	
GEOG689	Course GEOG689 Not Found (Human and Activity-Based Intelligence) Being developed	
GEOG690	Course GEOG690 Not Found (Data Visualization) Being developed	
GEOG691	Course GEOG691 Not Found (Food Security) Being developed	
GEOG696	Course GEOG696 Not Found (Independent Study in GEOINT (VPAC submitted)) Being developed	
Total Credits		**15**

Geospatial Intelligence (Z109)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The **Graduate Certificate in Professional Studies in Geospatial Intelligence (GCPS GEOINT)** is dedicated to providing workforce-focused training at graduate level in ways that can nimbly respond to developments in what is often a rapidly shifting landscape of applied problem-sets, analysis schemes, big and growing data-sets, and software platforms that characterize today's geospatial intelligence.

The GC GEOINT program entails 15 credits from five courses (GEOG661, GEOG662, GEOG697 and two elective courses). These courses cover spatial analysis, remote sensing, big data analytics, geovisualization, programming in web and mobile GIS, geospatial intelligence in various fields, etc.

The **Master of Science in Geospatial Intelligence (MS GEOINT)** is also offered, which entails 30 credits from 10 courses (five core and five elective courses). The credits earned from a GCPS GEOINT can be transferred towards the MPS GEOINT.

Financial Assistance

Teaching Assistantships are offered depending on availability and students' qualifications.

Contact

Ruibo Han
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1111b LeFrak Hall
7251 Preinkert Drive
University of Maryland
College Park, MD 20742
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Email: ruibo@umd.edu

Website: http:// **(**http://geoint.umd.edu**)geoint.umd.edu**

Courses: GEOG (p. 824)

Relationships: Geographical Sciences (GEOG) (p. 210) Geospatial Intelligence (GEIN) (https://academiccatalog.umd.edu/graduate/programs/geospatial-intelligence-gein/) Geospatial Intelligence (MPGI) (p. 217) Geospatial Information Sciences (MPGS) (p. 215) Geospatial Information Sciences (Z035) (p. 215)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationgeinz109ginoz135.pdf)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

The Graduate School requires all admitted graduate students to have a baccalaureate degree from a regionally accredited college or university in the United States, or the equivalent of a baccalaureate degree in another country.

Applicants with foreign credentials must submit academic records in the original language with literal English translations.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Fall 2021: 28 July	Spring 2021: 12 Feb
	Fall 2022: July 28, 2022	Spring 2022: February 8, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	N/A	N/A

Other Deadlines: Please visit the program website at http://geospatial.umd.edu/landing/Education (http://geospatial.umd.edu/landing/Education/)

Requirements

- Geospatial Intelligence, Post-Baccalaureate Certificate (P.B.C.) (p. 217)

Facilities and Special Resources

New classroom facilities are provided for GEOINT programs as part of the development of the Center for Geospatial Information Science. A dedicated set of server and high-performance computing clusters are also provided from CGIS for teaching GEOINT courses. Students also have full access to the resources (e.g. computer labs, software applications, seminars, etc) in the Geographical Sciences Department as regular graduate students. All registered students have full access to the facilities and resources (e.g. libraries, gym, computer labs) on campus.

Our local surroundings play host to the center of influence for the geospatial intelligence industry in the United States. The National Geospatial-Intelligence Agency employs 8,500 people at the third largest federal building in the D.C. region at nearby Springfield, VA. The NASA Goddard Space Flight Center in nearby Greenbelt, and the United State Geological Survey in nearby Reston, VA serve as the nexus for the nation's earth science geospatial intelligence. The U.S. Census Bureau in nearby Suitland, MD is tasked with a decennial nationwide data collection exercise that mobilizes a huge workforce to perform geospatial intelligence gathering year-round.

German Studies, Master of Arts (M.A.)

Thesis option: 30 credits

Non-thesis option: 30 credits

The M.A. degree program offers both a thesis and non-thesis option. For the thesis option, the student must complete 24 credits of coursework, 6 credits of MA thesis research (GERM799), and the thesis with oral defense. The non-thesis option requires 24 credits of coursework, 6 credits of Colloquium in German Studies credits (GERM699), and a mini-thesis with oral presentation.

Course	Title	Credits
GERM620	Methods of German Literary Studies I: Theory	3
German courses at the 600-800 level		15
Thesis or Non-Thesis Requirements		**12**
Thesis:		
Electives		
GERM799	Master's Thesis Research	
Pass an oral defense		
Non-Thesis:		
Electives		
GERM699 COLLO(	Course GERM699 COLLOQUIUM IN GERMAN STUDIES Not Found	
Total Credits		**30**

[1] All Teaching Assistants are required to take SLLC601 for one credit. This course counts towards the total credits required.

In footnote, please change SLLC601 to GERM619, since SLLC601 is no longer being offered.

German Studies, Doctor of Philosophy (Ph.D.)

Doctoral students must complete 24 credits of coursework beyond the master's degree over a period of at least one year at the University of Maryland in addition to 12 credits of doctoral dissertation research. Other doctoral requirements include:

1. a reading skill examination in a language other than English or German, which may be another Germanic language or a language related to the candidate's research;
2. comprehensive written examinations;
3. presentation of the dissertation, an original study in the field of specialization on a topic approved by the adviser and the examining committee; and
4. the oral defense of the dissertation (one to two hours)

Course	Title	Credits
Coursework beyond the master's degree		24
Dissertation Research Requirements		
GERM899	Doctoral Dissertation Research	12
Total Credits		**36**

German Studies (GERS)

Graduate Degree Program
College: Arts and Humanities

Abstract

The German Program of the Department of Germanic Studies offers graduate study leading to the M.A. and Ph.D. degrees. The main focus is on Modern German Studies combining both discipline-based and interdisciplinary courses. The intellectual focus of the degrees is German-

speaking Europe from the Enlightenment to the present, as represented in literary and non-literary texts, and other cultural productivity.

The degrees reflect the paradigm shift within the field of German language and literature expanding the focus of Germanistik to a broader concentration on cultural studies which include gender studies, film studies, and postcolonial theory.

Financial Assistance

The German Program offers graduate fellowships and teaching assistantships, and the Graduate School offers, **on a competitive basis, fellowships, and grants.**

Contact

Julie Koser
Associate Professor & Graduate Director
Department of Germanic Studies
School of Languages, Literatures, and Cultures
University of Maryland
3215 Jimenez Hall
4125 North Library Lane
College Park, MD 20742
Telephone: 301.405.4106

Website: http://www.sllc.umd.edu

Courses: GERM (https://umd-curr.courseleaf.com/graduate/courses/germ/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 13, 2022	September 29, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 13, 2022	September 29, 2021

RESOURCES AND LINKS:

Program Website: http://www.sllc.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- German Studies, Doctor of Philosophy (Ph.D.) (p. 218)
- German Studies, Master of Arts (M.A.) (p. 218)

Facilities and Special Resources

In addition to its course offerings listed below, the German Program of the Department of Germanic Studies sponsors the German Club, the University of Maryland Chapter of Delta Phi Alpha (the national German language honors society). The department participates in the University Honors Programs and has a departmental honors program. Distinguished scholars and lecturers as well as visiting professors visit the metropolitan area and campus regularly. College Park's proximity to Washington, D.C., facilitates participation in the many cultural functions of the capital with its wealth of German and Scandinavian social groups and national societies: the Embassies of Austria, Denmark, Germany, Norway, Sweden, Switzerland; the German Historical Institute, and the Goethe Institute.

Gerontology, Post-Baccalaureate Certificate (P.B.C.)

21 credits required

At least 12 credits should be designated at the 500 level or higher. At least 3 credits should be completed on the College Park campus.

Required courses with aging related content:

Course	Title	Credits
Course that includes physical bases of aging		3
Course that includes psychological bases of aging		3
Course that includes social bases of aging		3
Internship		6
Elective courses with aging related content		6
Total Credits		**21**

Gerontology (doctoral level) (Z101)

Graduate Certificate Program
College: Public Health

abstract

Students gain the knowledge and skills needed to effectively promote the health and well being of the growing population of baby boomers and older persons. Designed for students pursuing a doctoral program in the University System of Maryland or those who have previously earned a graduate degree from an accredited institution, the Graduate Certificate in Gerontology can be valuable complement to many degree programs. The GGCP offers students an individually tailored curriculum of course work, supervised internships and research.

contact

Lori Simon-Rusinowitz, Ph.D.
Director of Graduate Studies
Department of Health Service Administration
3310 SPH Building
University of Maryland
College Park, MD 20742
Telephone: 301.405.2548

Email: lasr@umd.edu

Website: http://www.sph.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- CV/Resume
- Previously earned doctoral degree

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	2 June	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.sph.umd.edu

Requirements

- Gerontology, Post-Baccalaureate Certificate (P.B.C.) (p. 219)

Gerontology, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

At least 12 credits should be designated at the 500 level or higher. At least 3 credits should be completed on the College Park campus.

Required courses with aging related content:

Course	Title	Credits
Course that includes physical bases of aging		3
Course that includes psychological bases of aging		3
Course that includes social bases of aging		3
Internship		3
Elective courses with aging related content		6
Total Credits		**18**

Gerontology (master's level) (Z100)

Graduate Certificate Program
College: Public Health

abstract

Students gain the knowledge and skills needed to effectively promote the health and well being of the growing population of baby boomers and older persons. Designed for students pursuing a master's program in the University System of Maryland or those who have previously earned a graduate degree from an accredited institution, the Graduate Certificate in Gerontology can be valuable complement to many degree programs. The GGCP offers students an individually tailored curriculum of course work, supervised internships and research.

CONTACT

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Website: http://www.sph.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- CV/Resume
- Previously earned Master's degree

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	2 June	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.sph.umd.edu

Requirements

- Gerontology, Post-Baccalaureate Certificate (P.B.C.) (p. 220)

Global Health, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
MIEH605	Fundamentals of Global Health	3
MIEH620	Global Health Communication and Promotion	3
MIEH610	Global Health Program Planning and Evaluation	3
One additional approved course		3
Total Credits		**12**

Global Health (Z070)

Graduate Certificate Program
College: Public Health

Abstract

The Graduate Certificate in Global Health is designed to provide basic knowledge in global health delivery to those employed or seeking employment in positions requiring this knowledge or to individuals who desire this added credential. The Global Health Certificate provides knowledge of issues, policies, and practices in global health that enables individuals (many of whom do not have public health backgrounds) to work effectively in agencies and programs providing global health services. As an area for study, research, and practice, global health emphasizes translational health issues, synthesizing population-based prevention with evidenced-based, community-supported initiatives.

The Global Health Certificate requires completion of four courses (12 credits), three of which are required and a fourth of which is an elective. The core curriculum includes foundational aspects of global health, communication and promotion, and program planning and evaluation. The elective topics include history, diplomacy and/or social marketing in Public Health. A blended learning format featuring seminar-style, face-to-face instruction and online learning is offered at the College Park campus. Course descriptions can be found here: http://sph.umd.edu/department/miaeh/certificate-global-health (http://sph.umd.edu/department/miaeh/certificate-global-health/)

The Global Health Certificate is offered through the University of Maryland's School of Public Health, a leader in the discovery, application, and dissemination of public and global health knowledge in the state of Maryland, the nation, and the world. The School of Public Health has specifically targeted programs, curricula, service and research dedicated to the understanding and improvement of global health.

Contact

Maurice Rocque
Maryland Institute for Applied Environmental Health
2234T School of Public Health Building
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College Park, MD 20742
Telephone: 301.405.5509
Email: mrocque@umd.edu

Website: http://sph.umd.edu/degrees/certificate-global-health **(**http://sph.umd.edu/degrees/certificate-global-health/**)**

Courses: MIEH **(**https://umd-curr.courseleaf.com/graduate/courses/mieh/**)**

Admissions General Requirements

- Statement of Purpose: For Statement of Purpose explain why you are pursuing this certificate and what you hope to do with the completion of this certificate.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (1): The letter of recommendation needs to be an academic reference.
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Non-UMD students who would like to pursue the Certificate in Global Health should visit the UMD Graduate School Admissions (https://gradschool.umd.edu/admissions/) page for detailed application steps. http://gradschool.umd.edu/admissions (http://gradschool.umd.edu/admissions/)

UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS). For additional requirements, please see: http://oes.umd.edu/professional-programs/global-health/gh-admission-information#international (http://oes.umd.edu/professional-programs/global-health/gh-admission-information/#international)

Current graduate students within the School of Public Health may enroll in courses that fulfill the requirements of the Certificate in Global Health. Please contact your Graduate Director or the certificate program for more information.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Fall 2019: 26 July	10 Jan
	Fall 2020: 31 July	

International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://sph.umd.edu/degrees/certificate-global-health (http://sph.umd.edu/degrees/certificate-global-health/)

Requirements

- Global Health, Post-Baccalaureate Certificate (P.B.C.) (p. 221)

Government and Politics, Master of Arts (M.A.)

30 credits required

Master of Arts (M.A.) The graduate program in the Department of Government and Politics is designed for doctoral students. Except for students participating in our dual-degree program with the United States Naval Academy, we do not accept students for the sole purpose of acquiring a Master's degree. Doctoral students may obtain a Master of Arts Degree during their course of doctoral study once they have satisfied the requirements associated with the Master's degree.

Course	Title	Credits
Core Requirements		
Complete 10 courses		30
Pass a comprehensive exam		
Complete two seminar papers		
Total Credits		**30**

Government and Politics, Doctor of Philosophy (Ph.D.)

Students are required to complete 42 credits of coursework, in addition to 12 credits of GVPT899. The doctoral program is intended to provide students with the knowledge, methodological skills and research experience appropriate for persons who intend to enter the discipline of political science. Students must complete 42 hours of graduate work including courses in political theory and research methods and pass written comprehensive examinations in two fields. Although formal coursework and field examinations are important components of the doctoral program, the research component, especially in the form of the dissertation is paramount. Consequently students who are able to demonstrate an interest in quality research activities and desire to become creators as well as consumers of knowledge are appropriate for the doctoral program.

Advance to Candidacy: In addition to course requirements, students are also required to complete two comprehensive exams, a third year paper, and pass the Prospectus Defense.

Post-Candidacy: Complete at least 12 credits of GVPT899 as well as successfully defend and submit an original dissertation.

Course	Title	Credits
Required courses:		
GVPT622	Quantitative Methods For Political Science	3
GVPT700	Scope and Method of Political Science	3
Select one of the following courses:		3
GVPT741	Course GVPT741 Not Found	
GVPT742	Modern Political Theory	
GVPT743	Contemporary Political Theory	
Complete courses in one of the following fields:		33
American Politics		
International Relations		
Comparative Politics		
Political Philosophy/Normative Political Theory		
Dissertation Research Requirements		
GVPT899	Doctoral Dissertation Research	12
Total Credits		**54**

Field Options

American Politics

Course	Title	Credits
GVPT770	Seminar in American Political Institutions	3
GVPT771	Seminar in American Political Behavior	3
Select 27 additional credits of GVPT courses at the 600 level or above		27
Total Credits		**33**

International Relations

Course	Title	Credits
GVPT708	Seminar in International Relations Theory (GVPT708A - Seminar in International Relations Theory)	3
Select 30 additional credits of GVPT courses at the 600 level or above		30
Total Credits		**33**

Comparative Politics

Course	Title	Credits
GVPT780	Seminar in the Comparative Study of Politics	3
Select 30 additional credits of GVPT courses at the 600 level or above		30
Total Credits		**33**

Political Philosophy/Normative Political Theory

Course	Title	Credits
Select 33 credits of GVPT courses at the 600 level or above		33
Total Credits		**33**

Government and Politics (GVPT)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Department of Government and Politics offers a Ph.D. degree in political science, intended primarily for those planning academic careers. Students can specialize in American politics, comparative politics, international relations, and political theory. In addition, students can study in depth more specialized fields such as public law, national security, public policy, political psychology, international and inter-ethnic conflict, international political economy, urban politics, post-Soviet and post-communist studies, East-Asian studies, environmental politics, and the politics of advanced industrial societies.

Financial Assistance

In addition to fellowships and teaching assistantships, the Department also has a public service intern program for students interested in State government. There are also a limited and variable number of research positions available.

Fellowships in Support of Diversity and Inclusion (https://gvpt.umd.edu/graduate/fellowships-support-diversity-and-inclusion-behavioral-and-social-sciences/) (optional): *If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social Sciences (2017-18), please be sure to upload your materials under "4. Supplementary Application Two" when submitting your online admissions application.*

Contact

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Website: http://www.gvpt.umd.edu

Courses: GVPT **(**https://umd-curr.courseleaf.com/graduate/courses/gvpt/**)**

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) - waived for 2022 cycle
- CV/Resume
- Writing Sample

The Department recruits highly qualified students and admits only a limited number of the strongest applicants. The Admissions Committee rarely grants provisional or conditional admission to the graduate program. The Department does not usually admit M.A. applicants. Only students whose ultimate objective is the Ph.D. should apply for direct admission to that program. Admission is granted only for the Fall Semester.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 20, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 20, 2022

RESOURCES AND LINKS:
Program Website: http://www.gvpt.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Government and Politics, Doctor of Philosophy (Ph.D.) (p. 222)
- Government and Politics, Master of Arts (M.A.) (p. 222)

Facilities and Special Resources

Graduate students in the department participate in the activities of the Public Service Intern Program, Project ICONS, the Center for International Development and Conflict Management, the Center for the Study of American Politics and Citizenship, the Center for the Study of Post-Communist Societies, The Committee on the Political Economy of the Good Society, and the Harrison Program on the Future Global Agenda.

Government and the Private Economy, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Government & The Private Economy (Z002)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Government and the Private Economy, Post-Baccalaureate Certificate (P.B.C.) (p. 223)

Health Administration, Master of Health Administration (M.H.A.)

Non-thesis option: 45 credits
Thesis option: 45 credits

Students completing the thesis option will replace their 3-credit capstone (HLSA786) with a 6-credit thesis experience (HLSA799). Three credits of the HLSA799 will then replace one course in the management module, so that only 6 courses in the management module are required for graduation.

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
HLSA601	Introduction to Health Systems	3
HLSA778	Internship in Public Health	4
Management electives		12
Policy/Economics elective		3
Data/Research elective		3
Thesis or non-thesis option:		**6**
Non-thesis:		
HLSA786	Capstone Project in Public Health	
Elective		
Thesis:		
HLSA799	Master's Thesis Research	
Total Credits		**45**

Health Administration (HLSA)

Graduate Degree Program
College: Public Health

Abstract

We are excited to inform you that we have changed the name of the on-campus MHA to the MPH in Healthcare Management. The new name better reflects the content of the degree that is designed to give students a strong knowledge base in health care management and health service delivery systems and an understanding of the basic and core principles of public health. If you have any questions about the change, please contact Melvin Seale at mseale@umd.edu***.***

Please see the Master of Public Health in Health Care Management (https://academiccatalog.umd.edu/graduate/programs/health-care-management-hlcm/) program page for more information.

Admissions

Please see the Master of Public Health in Health Care Management (https://academiccatalog.umd.edu/graduate/programs/health-care-management-hlcm/) program page.

Requirements

- Health Administration, Master of Health Administration (M.H.A.) (p. 224)

Health Equity, Master of Public Health (M.P.H.)

Non-thesis option: 45 credits
Thesis option: 45 credits

Students completing the thesis option will replace their 3-credit capstone (HLSA786) with a 6-credit thesis experience (HLSA799). Three credits of the HLSA799 will then replace one course in the management module, so that only 6 courses in the management module are required for graduation

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
HLSA601	Introduction to Health Systems	3
HLSA611	Introduction to Health Equity	3
HLSA787	Minority Health and Health Equity	3
HLSA778	Internship in Public Health	4
HLSA786	Capstone Project in Public Health	3

Cognate Electives	9
Methods Electives	6
Total Credits	**45**

Health Equity (HLEQ)

Graduate Degree Program
College: Public Health

Abstract

The Master of Public Health (MPH) degree with a concentration in Health Equity is a 45-credit interdisciplinary professional degree. It is a school wide program, currently administered by the Department of Health Services Administration.

The MPH program in Health Equity is designed to train students as public health scientists and practitioners that focus practice and/or research activities on the recognition, description and elimination of health disparities. Health disparities exist across several groups such as race/ethnic groups, geographic residence, gender, sexual orientation, age, and disability status. Public health and health care practitioners and researchers play a critical role in the identification and amelioration of health disparities and in working towards achieving health equity.

The MPH program in Health Equity is a unique and interdisciplinary program with students taking courses across all departments at UMD-SPH and across the UMD campus. The expertise gained through the MPH in Health Equity prepares students for careers that involve integrating health equity into public health practice at various levels. Various agencies in the state (e.g., county and state health departments) and across the nation (e.g., NIH and CDC), including colleges/universities, health-related agencies, community groups, and even large corporations (hospitals and insurance plans), employ public health professionals with a deep understanding of health disparities in order to design, implement, evaluate, and monitor interventions and policies to improve the health of their constituents by working towards health equity.

To accommodate a variety of career pursuits, students have flexibility in designing their course structure. Once a foundational knowledge is acquired through the MPH program's core requirements, students are encouraged to take electives across a range of disciplines. A large number of elective courses are available within the existing graduate curriculum across all departments in the School of Public Health as well as across other UMD colleges and DC area institutions. Students will be advised to work with SPH faculty for recommendations about how certain elective courses will best support particular career aspirations.

The curriculum is adaptable to both a full and part-time student status.

Please see our website for updated information on the program https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-health-equity (https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-health-equity/)

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Website: https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-health-equity (https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-health-equity/)

Relationships: Health Administration (HLSA) (p. 224) Health Policy Analysis and Evaluation (HPAE) (p. 226) Health Services (PHHS) (p. 228) Principles of Public Health (Z076) (p. 327) Public Health Practice and Policy (PHPP) (p. 339)

Courses: SPHL (https://umd-curr.courseleaf.com/graduate/courses/sphl/) HLSA (https://umd-curr.courseleaf.com/graduate/courses/hlsa/)

Admissions

The MPH in Health Equity program has a two-step application process. Applicants first submit the SOPHAS application (www.sophas.org (https://sophas.org/)), the centralized application service for schools and programs of public health (Step 1). Once the SOPHAS application has been verified applicants will submit their UMD Supplemental application (Step 2). Applicants will receive an email from the SPH Admissions team with instructions for how to complete the UMD Supplemental Application. Applications will not be reviewed until both the SOPHAS and UMD Supplemental applications are completed.

GENERAL ADMISSION REQUIREMENTS

- A Bachelor's degree
- Minimum 3.0 undergraduate GPA
- At least one undergraduate math course
- Transcripts from all previous coursework
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose and objectives including career and educational goals, professional experience, and areas of interest, and faculty you are interested in working with

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS application (Step 1) & UMD Supplemental application (Step 2)
- Three letters of recommendation
- Resume or curriculum vitae
- Fit between applicant's goals and expectations and program degree competencies
- Official GRE Test Score submission is waived for Fall 2022 admissions. GRE scores won't be reviewed.
- A writing sample is optional

For detailed instructions on how to submit your application, please visit the School of Public Health Website: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Dec. 17, 2021 (priority SOPHAS) / Jan. 14, 2022 (priority UMD Supplemental)	N/A
	May 6, 2022 (final SOPHAS) / June 3, 2022 (final UMD Supplemental)	
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Dec. 17, 2021 (priority SOPHAS) / Jan.14, 2022 (priority UMD Supplemental)	N/A
	Feb. 11, 2022 (final SOPHAS) / Mar. 11, 2022 (final UMD Supplemental)	

PROGRAM SPECIFIC REQUIREMENTS

Program Website: https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-health-equity (https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-health-equity/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Health Equity, Master of Public Health (M.P.H.) (p. 224)

Health Policy Analysis and Evaluation, Master of Public Health (M.P.H.)

Non-thesis option: 45 credits
Thesis option: 45 credits

Students completing the thesis option will replace their 3-credit capstone (HLSA786) with a 6-credit thesis experience (HLSA799). Three credits of the HLSA799 will then replace one course elective, so that only 3 elective courses in the are required for graduation

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
HLSA601	Introduction to Health Systems	3
HLSA702	Policy and Politics of Health	3
HLSA711	Health Economics and Analysis	3
HLSA775	Public Health Research	3
HLSA778	Internship in Public Health	4
HLSA786	Capstone Project in Public Health	3
Electives		12
Total Credits		**45**

Health Policy Analysis and Evaluation (HPAE)

Graduate Degree Program
College: Public Health

Abstract

The Master of Public Health (MPH) degree with a concentration in Health Policy Analysis and Evaluation is a 45-credit professional degree offered by the Department of Health Policy and Management (HPM).

The MPH program in Health Policy Analysis and Evaluation is designed to train students as public health scientists and practitioners that focus practice and/or research activities on the understanding, analysis, evaluation, and development of health policy. Various agencies in the state (e.g., county and state health departments) and across the nation (e.g., NIH and CDC), including colleges/universities, health-related agencies, community groups, and even large corporations (health care systems and insurance plans), employ public health professionals with a deep understanding of health policy in order to design, implement, analyze and evaluate policies to improve the health of their constituents. This program prepares graduates to take leadership positions in government agencies, consulting companies, health care organizations such as hospitals, community clinics, or health systems corporations, as well as health policy research organizations.

The MPH concentration in Health Policy Analysis and Evaluation at the University of Maryland School of Public Health (SPH) is unique in that it focuses not only on health care policies but on the analysis and evaluation of all policies that affect the public's health such as policies related to public health organizations and other public policies in education, housing, nutrition, and environmental pollution, among others that have an impact on population health. Students in the program benefit from the SPH's location in the DC area, with its proximity to federal government and agencies tasked with developing and implementing health policies such as the Centers for Medicare & Medicaid Services, in particular the Center for Medicare & Medicaid Innovation, The Agency for Healthcare Policy and Research, the Environmental Protection Agency and Health Resources and Services Administration, as well as top private and non-profit research institutions such as RAND, Mathematica, The Urban Institute, and The Brookings Institution, which conduct high-quality, independent research and provide innovative, practical recommendations to health policy makers. Faculty in the HPM department has active collaborations with several of these agencies and institutions and students in the department have access to internships, capstone projects and post-graduation positions at these organizations. In addition, students in the program benefit for the HPM department's close links with the State of Maryland legislature

and students have interned with General Assembly members; in those experiences, they have conducted research on legislative issues, co-authored legislation, assisted in preparation for hearings, and other policy related tasks.

CONTACT

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Website: https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-health-policy-analysis-and-evaluation (https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-health-policy-analysis-and-evaluation/)

Relationships: Health Administration (HLSA) (p. 224) Health Equity (HLEQ) (p. 225) Health Services (PHHS) (p. 228) Principles of Public Health (Z076) (p. 327) Public Health Practice and Policy (PHPP) (p. 339)

Courses: SPHL (https://umd-curr.courseleaf.com/graduate/courses/sphl/) HLSA (https://umd-curr.courseleaf.com/graduate/courses/hlsa/)

Admissions

The MPH in Health Policy Analysis and Evaluation program has a two-step application process. Applicants first submit the SOPHAS application (www.sophas.org (https://sophas.org/)), the centralized application service for schools and programs of public health (Step 1). Once the SOPHAS application has been verified applicants will submit their UMD Supplemental application (Step 2). Applicants will receive an email from the SPH Admissions team with instructions for how to complete the UMD Supplemental Application. Applications will not be reviewed until both the SOPHAS and UMD Supplemental applications are completed.

GENERAL ADMISSION REQUIREMENTS

- A Bachelor's degree
- Minimum 3.0 undergraduate GPA
- At least one undergraduate math course
- Transcripts from all previous coursework
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose and objectives including career and educational goals, professional experience, and areas of interest

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS application (Step 1) & UMD Supplemental application (Step 2)
- Three letters of recommendation
- Resume or curriculum vitae
- Fit between applicant's goals and expectations and program degree competencies
- Official GRE Test Score submission is **waived** for Fall 2022 admissions. GRE scores won't be reviewed.
- A writing sample is optional

For detailed instructions on how to submit your application, please visit the School of Public Health Website: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	SOPHAS - Priority: 17 Dec / Final: 6 May	N/A
	Supplemental - Priority: 14 Jan / Final: 3 Jun	
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	SOPHAS - Priority: 17 Dec / Final: 11 Feb	N/A
	Supplemental - Priority: 14 Jan / Final: 11 Mar	

RESOURCES AND LINKS

Program Website: https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-health-policy-analysis-and-evaluation (https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-health-policy-analysis-and-evaluation/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Health Policy Analysis and Evaluation, Master of Public Health (M.P.H.) (p. 226)

Health Services Research, Doctor of Philosophy (Ph.D.)

50 credits required

Course	Title	Credits
Required courses:		
SPHL600	Foundations of Public Health	3
HLSA711	Health Economics and Analysis	3
HLSA725	Econometrics in Public Health	3
HLSA714	Economic Evaluation of Medical Care	3
HLSA787	Minority Health and Health Equity	3
HLSA790	Advanced Methods in Health Services Research	3
HLSA723	Health Policy Analysis and Advocacy	3
HLSA766	Foundational Readings in Health Services Research	3

Module courses		14
Dissertation Research Requirements		
Module 4: Dissertation credits:		
HLSA899	Doctoral Dissertation Research	12
Total Credits		**50**

Health Services Research (PHHS)

Graduate Degree Program
College: Public Health

Abstract

The goal of the doctoral program in Health Services Research is to provide interdisciplinary training in research, practice, and policy analysis relevant to the planning, administration, management, and evaluation of health and public health programs. The degree program will prepare students to advance research, policy, and practice to order to improve access, cost, and quality of health services, with a particular emphasis on federal, state, and local health policy. The Ph.D. in Health Services Research requires a minimum of 50 credits organized in four modules. After module 1 (required core health services research courses), students select a cognate area or track. Potential tracks are: health economics, health policy, health equity/sociology of health, and an interdisciplinary track (developed with advisor's approval). Together with their advisor, students select 5 elective courses in the track of which 2 must be methods courses relevant to the cognate area. After completing the track coursework, students must pass a qualifying exam. All students must take an ethics course, a proposal development course and must pass an oral proposal defense to be admitted to candidacy. After candidacy, students take a graduate seminar, and dissertation credits which culminate in a doctoral dissertation and an oral dissertation defense. For further information go to https://sph.umd.edu/academics/doctoral-degrees/phd-health-services-research (https://sph.umd.edu/academics/doctoral-degrees/phd-health-services-research/).

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Website: https://sph.umd.edu/academics/doctoral-degrees/phd-health-services-research (https://sph.umd.edu/academics/doctoral-degrees/phd-health-services-research/)

Relationships: Health Administration (HLSA) (p. 224) Health Equity (HLEQ) (p. 225) Health Policy Analysis and Evaluation (HPAE) (p. 226) Principles of Public Health (Z076) (p. 327) Public Health Practice and Policy (PHPP) (p. 339)

Courses: SPHL (https://umd-curr.courseleaf.com/graduate/courses/sphl/) HLSA (https://umd-curr.courseleaf.com/graduate/courses/hlsa/)

Admissions

The Ph.D. in Health Services Research program has a two-step application process. Applicants first submit the SOPHAS application (www.sophas.org (https://sophas.org/)), the centralized application service for schools and programs of public health (Step 1). Once the SOPHAS application has been verified applicants will submit their UMD Supplemental application (Step 2). Applicants will receive an email from the SPH Admissions team with instructions for how to complete the UMD Supplemental Application. Applications will not be reviewed until both the SOPHAS and UMD Supplemental applications are completed.

GENERAL ADMISSION REQUIREMENTS

- Minimum 3.0 undergraduate GPA
- Transcripts from all previous coursework
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose and objectives including career and educational goals, professional experience, and research areas of interest

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS application (Step 1) & UMD Supplemental application (Step 2)
- Masters degree and course work in public health or related areas
- Three letters of recommendation
- Resume or curriculum vitae
- Fit between applicant's goals, expectations and research interests and program competencies and faculty expertise
- Official GRE Test Score submission is **required**. GRE taken within the past 5 years should be in the 50th percentile or higher. Please have ETS send scores to SOPHAS (code 0485) and UMD (code 5814)

For detailed instructions on how to submit your application, please visit the School of Public Health Website: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/).

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	SOPHAS - Priority: 12 Nov / Final: 11 Feb
	Supplemental - Priority: Dec 10 / Final: Mar 11
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	SOPHAS - Priority: 12 Nov / Final: 11 Feb
	Supplemental - Priority: Dec 10 / Final: Mar 11

RESOURCES AND LINKS

Program Website: https://sph.umd.edu/academics/doctoral-degrees/phd-health-services-research (https://sph.umd.edu/academics/doctoral-degrees/phd-health-services-research/)

Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Health Services Research, Doctor of Philosophy (Ph.D.) (p. 227)

Hearing and Speech Sciences, Doctor of Audiology (Au.D.)

The Department of Hearing and Speech Sciences offers two doctoral degree options for individuals seeking a clinical doctorate in Audiology. See CAUD (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs-detail.php?CAUD) for more details. The Au.D. curriculum meets requirements specified in the Standards for the Certificate of Clinical Competence in Audiology (CCC-A) of the American-Speech-Language-Hearing Association. The CCC-A is the minimum qualification for practice in Audiology required by most states and jurisdictions. The Au.D. program for post-BA students requires 57 hours of graduate coursework, 4 credit hours for a capstone research project, 14 hours of clinical practicum registration and 18 credit hours of full-time clinical internship registration, for a total of 93 credit hours. Au.D. students must pass comprehensive examinations and complete a capstone research project. Full-time students are expected to complete the program in 4 years. The Au.D. 'fast-track' program for returning students who already hold an M.A. degree in Audiology and Clinical Certification requires 30 credit hours of graduate coursework and 6 credit hours for a doctoral research project. There is no minimum requirement of supervised clinical practicum experience, although clinical practicum will be available to students as needed. The dual degree Au.D./Ph.D. track in Audiology is designed for students wishing to be trained as scientist-practitioners. The dual degree program requires 60 credits of graduate coursework, 6 credit hours of pre-candidacy research, 12 credit hours of dissertation research, 12 credit hours of clinical practicum registration, and 18 credit hours of full-time clinical internship registration, for a total of 108 credit hours. The Au.D./Ph.D. curriculum is designed to meet requirements specified in the Standards for the Certificate of Clinical Competence in Audiology (CCC-A) of the American Speech-Language-Hearing Association, and by the Graduate School. Ph.D. students must develop an individual study plan with the approval of a faculty Program Planning Committee, pass comprehensive examinations, and complete a dissertation and oral defense. Full-time students are expected to complete the dual-degree program in approximately 6 years.

Hearing and Speech Sciences, Master of Arts (M.A.)

The Department of Hearing and Speech Sciences offers the Master of Arts degree with major emphasis in Speech-Language Pathology (p. 381) with either the thesis or the non-thesis option.The Master's degree is required by national credentialing standards for individuals intending to practice as speech pathologists in schools, hospitals, rehabilitation facilities, hearing and speech centers or in other clinical settings. Academic course work, which includes a minimum of 36 credits, is supplemented by additional credit registrations in supervised clinical practica in the University Speech and Hearing Clinic and in selected outside clinical facilities so that the graduate will meet the academic and practicum requirements for the Certificate of Clinical Competence (C.C.C.) issued by the American Speech-Language-Hearing Association, and be eligible for licensure in the State of Maryland and other jurisdictions. The Master's degree program is accredited by the Council on Academic Accreditation, the national accrediting agency which oversees graduate programs in Speech-Language Pathology and Audiology. A full description of the Master's degree program is available at our web site, listed below.

Hearing and Speech Sciences, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 32 credits of coursework, in addition to 18 credits of research requirements. Students are also required to participate in a Professional Development Seminar each year for five years, complete a teaching portfolio, and pass a comprehensive exam.

The Department also offers the Doctor of Philosophy degree with a major emphasis in speech, language or hearing. Students with a B.A. or M.A. are considered for admission to the doctoral program. Matriculated doctoral students will choose within their major a special interest area, which may focus on the normal aspects of their major or disorders related to the major. A student must also select a minor area of study either from within or outside departmental offerings. There are no foreign language requirements, but advanced courses in statistics and experimental research design are required for the degree. Course programs are planned by the student and a committee of at least four faculty members. All doctoral students are expected to participate in varied research activities within the Department for academic credit.

Advance to Candidacy: In addition to course requirements, students must complete a teaching portfolio as well as successfully pass a written and oral comprehensive examination.

Post-Candidacy: Doctoral students complete at least 12 semester hours of HESP899 dissertation research credit before completing the degree.

A full description of the Doctoral program, as well as listings of faculty research expertise, can be found at the Departmental website (https://hesp.umd.edu/graduate/program-highlights-doctoral-program-hearing-and-speech-sciences/).

Course	Title	Credits
Complete 32 credits of coursework		32
Dissertation Research Requirements		
HESP898	Pre-Candidacy Research	6
HESP899	Doctoral Dissertation Research	12
Total Credits		**50**

Hearing and Speech Sciences (HESP)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Department of Hearing and Speech Sciences provides the opportunity for advanced graduate study in the communication sciences and disorders. The department offers three degrees; this entry is for the Ph.D. program, with concentrations in Hearing, Speech or Language.

Students applying to the Ph.D. program can opt to receive an MA in Speech-Language Pathology en route to the final degree. Students interested in the clinical MA degree in Speech-Language Pathology (p. 381) should see SPLA and use this code when applying for admission to study; students interested in a clinical doctorate in Audiology should see CAUD and use this code when applying for admission to study). At the doctoral level, the Ph.D. is offered in Hearing and Speech Sciences, with concentrations in Hearing, Speech or Language.

Financial Assistance

A limited number of graduate assistantships and fellowships are available through the Department. Assistantships that carry teaching, research or clinical responsibilities are awarded on a competitive basis. The Department also recommends outstanding students for Graduate School Fellowships; many of these fellowships have early deadlines for recommendations, so students are encouraged to submit their applications to the department early to ensure full consideration for funding. Students may also seek assistantships elsewhere on campus (such as through the Dean's office or through other departments) or doctoral fellowships sponsored by Federal agencies (e.g., NIH or NSF) or private foundations (e.g., American Speech-Language-Hearing Foundation). Fellowships in Support of Diversity and Inclusion (optional): If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social Sciences, please be sure to upload your materials under "Supplementary Application" when submitting your online admissions application.

Fellowships in Support of Diversity and Inclusion (https://hesp.umd.edu/graduate/prospective-students-funding-your-graduate-education/) (optional): If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social Sciences (2017-18), please be sure to upload your materials under "Supplementary Application" when submitting your online admissions application.

Contact

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Email: sander22@umd.edu

Website: http://www.hesp.umd.edu

Courses: HESP **(**https://umd-curr.courseleaf.com/graduate/courses/hesp/**)**

Relationships: Clinical Audiology (CAUD) **(**p. 125**)** Human Development (EDHD) **(**p. 245**)** Linguistics (LING) **(**p. 274**)** Neurosciences and Cognitive Science (NACS) **(**p. 312**)** Speech Language Pathology (SPLA) **(**p. 381**)**

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/umdsupplementaryapplicationcaudsplahespcert.pdf)
- Writing Sample: Writing Sample should be recent, 5-10-page scholarly writing, such as a first-authored peer-reviewed publication or other scholarly assignment – uploaded to the Uploads Requirements section of the application.

Admission to the doctoral programs is on a very competitive basis. Our program is a mentoring-based program; we only accept doctoral students for whom there is an obvious mentor who is willing to work with that student. Students typically have high GPA and GRE scores, excellent letters of recommendation and statements of purpose, and a high-quality writing sample. Admission is currently confined to fall matriculation; early application is encouraged.

Admission to the Ph.D. degree program may be offered to applicants with either a Bachelor's or Master's degree. Clinical certification is not required for the degree, although a clinical graduate degree may be needed in addition to the Ph.D. degree for employment in some university settings. Students who wish to receive both degrees can apply to the Ph.D. program and receive a clinical MA while working towards the doctoral degree. Requirements for completion of a program of doctoral study are dependent on a student's prior background in the communication sciences and disorders.

Applicants interested in pursuing an integrated research-clinical doctorate in speech-language pathology (M.A./Ph.D.) should apply to the Ph.D. program and indicate their intention in the Statement of Purpose. Applicants interested in pursuing the dual-degree path in Audiology (Au.D.-Ph.D.) should apply to the Au.D and indicate their intention in the Statement of Purpose. Students may enter the Ph.D track towards the end of their 2nd year, pending decision of the departmental admissions committee.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 5, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 5, 2022

RESOURCES AND LINKS:

Program Website: http://www.hesp.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Hearing and Speech Sciences, Doctor of Philosophy (Ph.D.) (p. 229)

Facilities and Special Resources

The Department's facilities include

1. numerous modern research laboratories equipped to support research in the areas of: acoustic phonetics, psychoacoustics, infant and adult speech perception,neuropsychology, language and language development, voice, fluency and electrophysiology. There are multiple sound-attenuating chambers and one electrically-shielded chamber devoted to research with humans, which are all integrated with computers and peripheral equipment for acoustic signal development, signal analysis, presentation and on-line data collection;
2. the Hearing and Speech Clinic at UMCP. this clinic serves as the initial practicum site for all students pursuing clinical training. The Clinic includes multiple audiological test suites equipped for diagnostic testing, a complete hearing aid dispensary, a group rehabilitation room, and state-of-the-art equipment for behavioral and electrophysiological diagnostic testing, as well as hearing aid selection and fitting. Ten speech and language diagnostic and therapy rooms are integrated with observation areas; and
3. an on-site language pre-school (LEAP, the Language-Learning Early Advantage Program), also equipped for observation. Students pursuing clinical training in Audiology will also have access to the Audiology Service, Division of Audiology-Head and Neck Surgery, of the University of Maryland and University Hospital in Baltimore (UMB), for part-time clinical rotations or full-time clinical externships. This Service provides a full range of auditory and vestibular diagnostic and rehabilitative services in a large metropolitan hospital setting. Externally-funded research projects are an integral part of the activities at UMB. All of the clinical and research facilities are potentially available for the conduct of student-directed research projects, or for student participation in faculty-initiated research projects. Additional research and clinical facilities are available in the Washington and Baltimore metropolitan areas. The Library of Congress, the National Library of Medicine and the libraries of various medical schools in the Washington-Baltimore area supplement the University's extensive libraries at College Park.

The Department of Hearing and Speech Sciences participates in the Neuroscience and Cognitive Sciences graduate program (see NACS), the Comparative and Evolutionary Biology of Hearing Training Grant, and the Maryland Language Science Center, and has ties to the Center for Advanced Study of Language (CASL); these connections afford students the opportunity to work with faculty in other departments at the University of Maryland, College Park, or at UMB.

Higher Education, Master of Arts (M.A.)

Non-thesis only: 36 credits required

Course	Title	Credits
Required courses:		
EDHI650	Professional Seminar in Higher and Adult Education	3
EDHI652	Higher Education in American Society	3
EDHI666	The Academic Profession	3
EDHI754	Higher Education Finance	3
EDHI672	Modes of Inquiry in Education Research	3
EDHI489	Field Experiences in Education	3
EDHI679	Master's Seminar	3
EDHIxxx Electives		9
Qualitative Research course		3
Quantitative Research course		3
Total Credits		**36**

Higher Education, Doctor of Philosophy (Ph.D.)

Students are required to complete 90 credits beyond the Bachelor's degree, including 12 credits of EDHI899. Coursework may be satisfied prior to study.

Advance to Candidacy: In addition to course requirements, students must successfully pass a comprehensive exam in order to advance to candidacy.

Post-Candidacy: Complete at least 12 credits of EDHI899 doctoral dissertation research as well as successfully defend and submit an original dissertation.

Course	Title	Credits
Required courses:		
EDCP870	Professional Issues Seminar	3
EDHI672	Modes of Inquiry in Education Research	3
EDHI895	Research Critique Seminar	3
Quantitative Research course		3
Qualitative Research course		3
Two additional Research courses		6
Cognate courses		24
Domain Knowledge courses		18
Disciplinary Perspectives		15
Dissertation Research Requirements		
EDHI899	Doctoral Dissertation Research	12
Total Credits		**90**

Higher Education (HIED)

Graduate Degree Program
College: Education

Abstract

Higher Education is an area of concentration within the Higher Education, Student Affairs, and International Education (HESI) program at the University of Maryland. As a nationally recognized graduate area of concentration, Higher Education at Maryland prepares students for leadership positions in higher education institutions and policy organizations, as well as engagement in scholarship. Alumni of the Higher Education concentration work as mid- and senior-level college administrators, higher education policy makers and analysts as well as university faculty.

It is important to note that while being a concentration in HESI, the Higher Education concentration is a distinct program with its own admission criteria and requirements. Students can take courses in the following areas: Policy and Finance; Diversity and Student Experiences; Leadership and Organization; and Academic Professions. In addition, in conjunction

with their faculty advisor, students can design an area of specialization to meet their individual needs. Higher Education students can also take courses in areas such as business, public affairs, and the social sciences. Programs of study are individually designed by students in consultation with their faculty advisor. Department courses are usually offered in the afternoon and evening.

Doctoral students with an interest in student personnel services can take courses in the Student Affairs concentration. The two concentrations offer distinct degrees but cooperate closely on course offerings. Because the University of Maryland is located close to the nation's capital, masters and doctoral students also have access to many seminars and presentations by higher education leaders and public policy makers in the Washington DC area.

Additionally, the Higher Education concentration is in a unique position to also offer students opportunities that enable them to gain practical experience in the form of internships at federal government agencies, public policy think tanks, and higher education advocacy organizations throughout the Washington DC area. In the past, in addition to interning at offices on campus and the University System of Maryland, students have interned at the US Senate, National Center for Education Statistics, American Council on Education, and the Institute of Higher Education Policy.

Admitted students to the Higher Education concentration are invited to our Preview Program each spring in order to interview for assistantships across Academic Affairs, Student Affairs and other administrative offices. Nine-and twelve-month assistantships are available. Some doctoral applicants may be recommended for fellowships by our admissions committee.

Financial Assistance

The Department has a very limited number of merit-based fellowships and graduate assistantships available to students. Fellowships are awarded to doctoral students in March only for the following fall semester. Assistantships are also awarded in the spring for the following fall semester, but occasionally an assistantship may become available at another time of year. A large number of assistantships are also available throughout campus, and many students regularly find assistantships in other departments and offices on campus. Both fellowships and assistantships are awarded on a competitive basis. It is to the student's advantage to apply well before the published application deadlines and to submit a complete application package if they intend to be considered for a fellowship, assistantship, or other form of financial aid. It is a requirement that a student be admitted as a condition of eligibility. International students' applications are not considered complete and are not reviewed by the Department until they have received clearance from the Office of International Student and Scholar Services (ISSS), which can take additional time.

If you need information about ISSS clearance, visit the ISSS website at http://www.umd.edu/ies (http://www.umd.edu/ies/). For more information on financial assistance, see the department website: http://www.education.umd.edu/chse/admissions/finance (http://www.education.umd.edu/chse/admissions/finance/).

Contact

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Website: http://www.education.umd.edu/chse (http://www.education.umd.edu/chse/)

Courses: EDCP (https://umd-curr.courseleaf.com/graduate/courses/edcp/) EDHI (https://umd-curr.courseleaf.com/graduate/courses/edhi/) EDPS (https://umd-curr.courseleaf.com/graduate/courses/edps/) HESI (https://umd-curr.courseleaf.com/graduate/courses/hesi/)

Relationships: International Education Policy (HIEP) (p. 256) Student Affairs (HISA) (p. 383)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Miller Analogies Test (MAT) (**Higher Education Concentration will not require the GRE or MAT for Fall 2021 admissions to either the MA or Doctoral programs)**
- CV/Resume
- Writing Sample

To be recommended for full admission to a doctoral or master's program, a minimum undergraduate grade point average of 3.0 is required. A minimum graduate grade point average of 3.5 is required for doctoral programs. Of the three scores on the Graduate Record Examination (verbal, quantitative, analytic), at least one should be at the 70th percentile or higher for PhD applicants (40th percentile or higher for master's applicants) and none should be under the 40th percentile for PhD applicants.

If the Miller Analogies Test is used, the score should be at least at the 70th percentile for PhD applicants (40th percentile for master's applicants). Students who do not meet one of these requirements, but show other evidence of outstanding potential, may be considered for provisional admission. For more information on admissions please refer to our website at http://www.education.umd.edu/CHSE/admissions/overview/ and click on prospective students.

It is recommended that, if possible, prospective students talk with concentration coordinators and faculty, and visit classes, to help determine if a particular concentration is appropriate to their academic interests and professional goals.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 3, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 3, 2021

RESOURCES AND LINKS:
Program Website: http://www.education.umd.edu/chse (http://www.education.umd.edu/chse/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Higher Education, Doctor of Philosophy (Ph.D.) (p. 231)
- Higher Education, Master of Arts (M.A.) (p. 231)

Facilities and Special Resources

Faculty and students in the Department work closely with area schools, colleges, universities, associations and other education-related organizations. Extensive resources in the Washington, D.C., area, including international agencies and non-governmental organizations, provide exceptional opportunities for internships, field experiences, and research to enhance formal course experiences.

Historic Preservation, Master of Historic Preservation (M.H.P.)

Non-thesis only (capstone project required): 45 credits

The Master of Historic Preservation (MHP) requires completion of 45 credits. Required courses cover history and theory of preservation, preservation law, historical research methods,documentation, conservation, preservation economics, preservation planning & policy, group studio/workshop, internship, and independent final project. Elective courses may be taken from all contributing HISP units, and other departments with prior approval from the HISP Director. A description of the full MHP curriculum is available on the program web site at http://arch.umd.edu/hisp/historic-preservation (http://arch.umd.edu/hisp/historic-preservation/).

Course	Title	Credits
Required courses:		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
HISP650	Historic Preservation Studio Workshop	6
HISP655	American Vernacular Architecture	4
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP680	Preservation Economics	3
HISP690	Historic Preservation Professional Practice (Preservation Management and Practice)	2
HISP710	Final Project in Historic Preservation I	1
HISP711	Final Project in Historic Preservation II	2
HISP660	Internship in Historic Preservation	0
Electives		9
Total Credits		**45**

Historic Preservation (HISP)

Graduate Degree Program
School of Architecture, Planning and Preservation

Abstract

Based in the School of Architecture, Planning, and Preservation, the Historic Preservation Program is a collaboration of faculty from across the University–from the departments of American Studies, Anthropology, Architecture, History, Landscape Architecture, Real Estate Development, and Urban Studies and Planning, as well as the National Trust Library. Our shared goal is educating professionals for work in a wide range of preservation organizations. Research on historic preservation issues is also a focus of the Program, pursued through faculty and student projects, in partnership with preservation organizations and University partners. With many preservation organizations and agencies in the DC area, you will learn from well-connected faculty and challenging internships that will allow you to expand and apply your knowledge and skills. You will experience two great laboratories in Baltimore and Washington; places and spaces where you can explore gentrification, sustainability and other pressing issues. We also sit within a broad cultural landscape that extends from the Atlantic coast to the mountains of Appalachia.

The Historic Preservation Program offers a Master of Historic Preservation (MHP) degree, a graduate Certificate, and several dual degrees (with Architecture, Planning, Real Estate Development, and Anthropology). The MHP is designed as a full-time, two-year curriculum leading to a professional degree. The 45-credit MHP curriculum includes core courses, an internship, an interdisciplinary studio course, a final project, and a large selection of electives to stimulate each student's particular interests. Students will be admitted to the program with a variety of backgrounds but with a demonstrated prior interest in the preservation field. (In some exceptional cases, students may be admitted to the program on a part-time basis.)

Financial Assistance

HISP's principal form of financial aid consists of graduate assistantships related to research and outreach activities. The assistantships consist of tuition remission as well as a stipend. In addition, the Program awards--in conjunction with local non-profit Prince George's Heritage--the Prince George's Heritage Preservation Fellowship, an annual competitive award for a HISP student or students whose Prince George's County related project is judged to be especially outstanding. Additionally, there are possibilities for paid internships and paid part-time work with a variety of national and local organizations and governmental agencies.

Contact

Contact the program at the following address:
HISP Graduate Admissions
School of Architecture, Planning and Preservation
University of Maryland
College Park, MD 20742
Or at the School of Architecture, Planning, and Preservation web site:
http://www.arch.umd.edu

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Email: jcwells@umd.edu

Website: http://www.arch.umd.edu

Courses: HISP

Relationships: Applied Anthropology and Historic Preservation (AAHP) (p. 43), Architecture and Historic Preservation (ARHP) (p. 55), Community Planning and Historic Preservation (CPHP) (p. 132), Historic Preservation and Real Estate Development (HPDV) (p. 235), History and Historic Preservation (HIHP) (https://academiccatalog.umd.edu/graduate/programs/history-historic-preservation-hihp/), Historic Preservation and American Studies (HPAM) (https://academiccatalog.umd.edu/graduate/programs/historic-preservation-american-studies-hpam/), Historic Preservation and Landscape Architecture (HPLA) (https://academiccatalog.umd.edu/graduate/programs/historic-preservation-landscape-architecture-hpla/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample: A writing sample of at least 10-30 pages. This can be previous individual academic work or professional work. It does not necessarily have to be related to historic preservation, however a related topic is preferred. Upload to the Writing Sample of the Uploads Requirements section of the application.
- Description of Research/Work Experience (optional)
- Portfolio PDF Upload (optional)

All applicants must have a bachelor's degree from an accredited institution. There is no restriction on the applicants' previous field of study, and indeed we encourage diversity in all senses.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 19, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 19, 2022

RESOURCES AND LINKS:
Program Website: arch.umd.edu (http://www.arch.umd.edu/)
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Historic Preservation, Master of Historic Preservation (M.H.P.) (p. 233)

Facilities and Special Resources

The University of Maryland's Historic Preservation Program is privileged to be part of a dynamic, successful preservation community that has long thrived throughout the state and in the District of Columbia. Opportunities to study and work abound in the incredibly diverse cities, towns, and landscapes across Maryland. In addition, the Program enjoys close relationships with many state, local, national, international and federal-government organizations working in historic preservation, as well as non-profit groups and private firms.

You will have the opportunity to combine your coursework with invaluable research and field-based professional training in documentation, policy and interpretation. Virtually every class gets you out in the field and connects you to preservation issues and practice in communities and neighborhoods. The program has an ongoing relationship with the Town of Bladensburg to use the Bostwick House property as a learning laboratory and classroom. This 1746 brick home and several farm outbuildings sit on a 10-acre parcel adjacent to the Anacostia River in the middle of suburban Bladensburg [www.bostwickhouse.weebly.com (http://www.bostwickhouse.weebly.com)] and just 10 minutes from campus.

The HISP program is directly related to and substantially enhanced by the National Trust for Historic Preservation Library, housed on the College Park campus since 1986 [https://archives.lib.umd.edu/repositories/2/resources/1342 (https://archives.lib.umd.edu/repositories/2/resources/1342/)]. This Library is one of the leading scholarly resources for preservation in the country.

The program is further strengthened by close working relationships with the Maryland Historical Trust, the National Park Service, the National Trust for Historic Preservation, the Maryland National Capital Park and Planning Commission, Historic Annapolis, Inc., Preservation Maryland, Prince George's Heritage, the Anacostia Trails Heritage Area, and others. Practical experience can be gained through a variety of internship opportunities with these organizations and many others.

Historic Preservation and Real Estate Development, Master of Historic Preservation and Master of Real Estate Development (dual degree) (M.H.P. and M.R.E.D.)

Non-thesis only: 66 credits required

Required courses cover history and theory of preservation, preservation law, historical research methods, documentation, conservation, preservation economics, preservation planning & policy, group studio/ workshop, and independent final project.

Real Estate requirements address real estate economics, finance, planning and entitlements, design and construction management and asset and property management.

The final project must not only address historic preservation or adaptive reuse issues, but must meet the requirements of an MRED Capstone project with real estate feasibility and pro forma modelling.

Course	Title	Credits
Historic Preservation courses		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
HISP630	Preservation Policy and Planning	3
HISP635	Social and Ethnic Issues in Historic Preservation Practice	3
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
HISP650	Historic Preservation Studio Workshop	6
HISP655	American Vernacular Architecture	4
HISP670	Conservation of Historic Places: Historic Materials, Building Systems, and Conservation	3
HISP690	Historic Preservation Professional Practice	2
HISP710	Final Project in Historic Preservation I	1
HISP711	Final Project in Historic Preservation II	2
Real Estate Development courses		
RDEV600	Principles and Practice of Real Property Development	3
RDEV603	Introduction to Real Property Finance	3
RDEV610	Real Property Development Law and Ethics	3
RDEV630	Real Property Finance and Investment	3
RDEV635	Capital Markets and Real Estate Investments for Developers	3
RDEV689	Current Topics in Real Estate Development (RDEV689F)	3
RDEV620	Market Analysis for Real Property Development	3
RDEV650	Essentials of Design and Construction Management for Development Professionals	3
RDEV660	Commercial Leasing for Real Property Developers	3
RDEV640	Principles of Urban Design for Real Property Developers	3
RDEV615	Principles, Process and Politics of Planning for Real Property Development	3
Total Credits		**66**

Historic Preservation and Real Estate Development (HPDV)

Graduate Degree Program
College: Architecture

Abstract

Based in the School of Architecture, Planning, and Preservation, the Historic Preservation Program is a collaboration of faculty from across the University--from the departments of American Studies, Anthropology, Architecture, History, Landscape Architecture, and Urban Studies and Planning, as well as the National Trust Library. Our shared goal is educating professionals for work in a wide range of preservation organizations. Research on historic preservation issues is also a focus of the Program, pursued through faculty and student projects, in partnership with preservation organizations and University partners.

The dual degree program in Historic Preservation and Real Estate Development is a 60 credit program that can be completed, by taking courses full time over 5 semesters (2 1/2 years), including at least one winter and summer term course. While not preferred students may be admitted to the program on a part-time basis. Consult with the HISP Program Director.

The final project for the HISP portion of the degree will also have to meet the requirements for a Capstone Project in real estate development and should be discussed early on with each Program Director to be sure it will meet the requirements of both.

Financial Assistance

HISP's principal form of financial aid consists of graduate assistantships related to research and outreach activities. The assistantships consist of tuition remission as well as a stipend. In addition, the Program awards--in conjunction with local non-profit Prince George's Heritage--the Prince George's Heritage Preservation Fellowship, an annual competitive award for a HISP student or students whose Prince George's County related project is judged to be especially outstanding. Additionally, there are possibilities for paid internships and paid part-time work with a variety of national and local organizations and governmental agencies.

The Colvin Institute provides scholarship funds to a number of highly qualified students each term. Scholarship determinations are made at the time of application and admission. Scholarships are generally awarded on a per course basis and commitments are made at the time of admission and apply for the duration of the entire program, subject to academic performance.

The MRED Program offers a limited number of administrative graduate assistantships to full time MRED students. Contact the Program Director

to apply. Periodically there are named scholarships provided by various real estate organizations or development companies.

In addition, there are work opportunities both on, and off campus, and they are relatively plentiful. Students in the past have been successful in finding part time internships and full time work with local real estate companies. The MRED student listserv posts openings periodically as they are brought to the attention of the Program by alumni, friends, faculty and sponsors.

Applicants should inquire as to the availability of scholarship funding for the term they are starting. Scholarships are typically for a portion of tuition only, and are paid on a per course basis as students progress through the program. Scholarships are available to part time, full time, and dual degree students.

Contact

Find additional information on program offerings, degree requirements, admissions, and financial aid on the School's Web site (www.arch.umd.edu (http://www.arch.umd.edu)).

Schedule a visit and tour online at: https://arch.umd.edu/resources/prospective-students (https://arch.umd.edu/resources/prospective-students/). Be sure to contact the Program Director for real estate development (mdaymars@umd.edu) if you wish to attend a sampling of classes while here.

For further information about the Preservation Program, please contact Jeremy Wells at jcwells@umd.edu (https://academiccatalog.umd.edu/graduate/programs/historic-preservation-real-estate-development-hpdv/jcwells@umd.edu).

For further information about the Real Estate Development Program and the Colvin Institute, please contact Maria Day-Marshall, JD, LLM, Clinical Associate Professor and Director of Graduate programs in Real Estate Development and the Colvin Institute of Real Estate Development, mdaymars@umd.edu.

Additional information on Case competitions, samples of student work, as well as syllabi and adjunct faculty can be found at the School's website: http://www.arch.umd.edu. You will also find the Colvin Institute offering outreach and information at the ICSC in Las Vegas each May, at the ULI National Conference each October, and at many local events of Bisnow, ICSC, ULI, CREW, WIRRE and HAND.

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Relationships: A (p. 36)rchitecture (https://academiccatalog.umd.edu/graduate/programs/architecture-arch/), Community Planning (https://academiccatalog.umd.edu/graduate/programs/community-planning-cmpl/)

Courses: HISP (https://umd-curr.courseleaf.com/graduate/courses/hisp/) RDEV (https://umd-curr.courseleaf.com/graduate/courses/rdev/)

Admissions

General Requirements

- Statement of Purpose: Statement of Purpose – In addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Skills Assessment (in the online application): This assessment is not used in determining your admission to the program. Self assessments are used for placing students into the proper sequence of courses once admitted.
- Writing Sample: A writing sample of at least 10-30 pages. This can be previous individual academic or professional work. It does not necessarily have to be related to historic preservation or real estate, however a related topic is preferred. The writing sample should demonstrate the ability to analyze a problem/question and clearly communicate your findings. Upload to the Writing Sample of the Uploads Requirements section of the online application.
- Must be admitted by both programs to pursue dual degree.

All applicants must have a bachelor's degree from an accredited institution. There is no restriction on the applicants' previous field of study, and indeed we encourage diversity in all senses.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	19 Jan
International Applicants	

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	19 Jan

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Historic Preservation and Real Estate Development, Master of Historic Preservation and Master of Real Estate Development (dual degree) (M.H.P. and M.R.E.D.) (p. 235)

Facilities and Special Resources

The School of Architecture, Planning, and Preservation and the Colvin Institute of Real Estate Development are ideally located between Washington, DC, and Baltimore and surrounded by a number of historic communities and a varied physical environment. The resulting opportunity for real estate development and historic preservation study is unsurpassed.

Close by the University are key historically important and interesting places in the development of U.S. communities, including the 4th settlement in America at Historic St. Mary's City in Southern Maryland, which was the first planned city in America. Just 10 minutes from campus is the 1930s new town of Greenbelt, Maryland, and within 45 minutes are the 1960's new towns of Columbia, Maryland, St. Charles, Maryland and Reston, Virginia. One of the best examples of new urbanism is the Kentlands development less than 30 minutes away. And not to be missed are the major redevelopment and urban living revivals in the Port City of Baltimore and the historic neighborhoods of Anacostia and Columbia Heights in the District of Columbia.

The University of Maryland's Historic Preservation Program is privileged to be part of a dynamic, successful preservation community that has long thrived throughout the state and in the District of Columbia. Opportunities to study and work abound in the incredibly diverse cities, towns, and landscapes across Maryland. In addition, the Program enjoys close relationships with many state, local, national, international and federal-government organizations working in historic preservation, as well as non-profit groups and private firms.

The HISP program is directly related to and substantially enhanced by the National Trust for Historic Preservation Library, housed on the College Park campus since 1986 [https://archives.lib.umd.edu/repositories/2/resources/1342 (https://archives.lib.umd.edu/repositories/2/resources/1342/)]. This Library is one of the leading scholarly resources for preservation in the country. The program is further strengthened by close working relationships with the Maryland Historical Trust, the National Park Service, the National Trust for Historic Preservation, the Maryland National Capital Park and Planning Commission, Historic Annapolis, Inc., Preservation Maryland, Prince George's Heritage, the Anacostia Trails Heritage Area, and others. Practical experience can be gained through a variety of internship opportunities with these organizations and many others.

The School's resources include a model shop, a digital fabrication lab, and both PC and MAC computer labs with REVIT, ARGUS, GIS, Maptitude and other design programs available. The School's library contains some 57,000 monographs and 6,000 current periodicals, making it one of the major architectural libraries in the nation. The National Trust Library for Historic Preservation, housed in McKeldin Library, contains 11,000 volumes and 450 periodical titles. THe Colvin Institute holds the entire library offerings of the Urban Land Institute and access to all the case studies published by ULI. The slide collection includes approximately 430,000 slides on architecture, landscape architecture, planning, and technical subjects. The interdisciplinary National Center for Smart Growth Education and Research is based in the School offering perspectives and opportunities to engage important issues facing urban and regional planning.

Both the Real Estate Development and Historic Preservation Programs benefit from the strong support of the professional community, including practitioners who bring expertise into the class room and project courses as instructors and advisors. The RDEV courses are all taught by working or retired real estate professionals giving unparalleled access for students to making connections with current practice in the industry.

Job placement for HISP graduates has been outstanding with graduates sought out by national, local and regional firms and agencies. The over 150 alumni of the real estate program have a very active and passionate group of grads in the area who meet regularly and share practice tips, connections and future job opportunities.

Historic Preservation, Post-Baccalaureate Certificate (P.B.C.)

16 credits required

Certificate students, in conjunction with their degree programs, complete the required introductory seminar (HISP600), a survey of preservation law, 15 credit hours of core courses, and the final seminar (HISP701). The total number of semester credit hours will vary according to the particular requirements of the specific degree program.

Course	Title	Credits
Required courses:		
HISP600	History, Theory, and Practice of Historic Preservation	3
HISP611	Historical Research Methods	3
or HISP655	American Vernacular Architecture	
HISP640	Historic Preservation Law, Advocacy and Public Policy	3
HISP701	Certificate Portfolio Project	1
Electives		6
Total Credits		**16**

Historic Preservation (Z005)

Graduate Certificate Program
College: Architecture

Abstract

The historic preservation certificate program is designed to provide students in allied graduate programs (for example, American studies, anthropology, history, landscape architecture, planning, real estate development, and architecture) at the College Park campus with a basic understanding of the discipline of historic preservation with an emphasis on connecting preservation practice with their home discipline.

Contact

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Website: http://www.arch.umd.edu

Relationships: Historic Preservation (HISP) (p. 233)

Courses: HISP (https://umd-curr.courseleaf.com/graduate/courses/hisp/)

Admissions

This program is only available to students currently enrolled in a graduate degree program at the College Park campus. For example, students pursing a MA or PhD in history or a MArch in Architecture may complete a certificate in historic preservation. Please contact the department for more information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please see the program website	Please see the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please see the program website	Please see the program website

Other Deadlines: Please visit the program website at http://www.arch.umd.edu

Requirements

- Historic Preservation, Post-Baccalaureate Certificate (P.B.C.) (p. 237)

Facilities and Special Resources

See Master of Historic Preservation (HISP) for more information.

History, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

Organized in the 1920s, the Master of Arts in History program at the University of Maryland provides broad and intensive instruction in bibliography, research, and writing in various fields of historical study. The MA degree may constitute a step toward doctoral research or preparation for a variety of other fields, such as archives administration, museum scholarship and exhibitions, public history, primary or secondary school teaching, law, or international relations.

Admission to the Master of Arts program is offered to highly qualified applicants holding at least a bachelor's degree, normally in history or a related discipline. Application and admissions procedures are described on the Department's website.

The MA degree program requires a total of thirty (30) semester hours of course work and research credits and the submission of one or two original research papers. In addition, MA students must successfully defend a thesis (the Degree-by-Thesis option) or pass a written examination (the Degree-by-Examination or 'non-thesis' option).

The anticipated period for completion is two (2) years of full-time study. The degree must be completed within five (5) years.

Thesis Option

Course	Title	Credits
HIST601	History and Contemporary Theory	3
Approved major field courses		9
HIST8xx Research Seminar		3
Electives		9
HIST799	Master's Thesis Research	6
Total Credits		**30**

Non-thesis Option

Course	Title	Credits
HIST601	History and Contemporary Theory	3
Approved major field courses		6
HIST8xx Research Seminar		6
Electives		15
Submit two research papers		
Total Credits		**30**

History, Doctor of Philosophy (Ph.D.)

First awarded in 1937, the Doctorate in History at the University of Maryland is conferred for superior achievement in historical study and research. The major portion of the degree is the dissertation, an original and noteworthy contribution to historical knowledge. In anticipation of this research, students must master the historical literature in their fields, bibliographic tools, research and writing methods, and general, special, and minor fields of study. Competence in these preliminary steps will be measured by successful completion of course work and by comprehensive examinations.

Doctoral students must complete 42 credits including 12 credits HIST899. Unless they have taken comparable courses elsewhere, students must complete the general seminar(s) in their major field, HIST601 (History and Contemporary Theory), a minimum of nine hours of reading courses, six hours of research seminars, and nine hours in a minor field.

Depending on the field of study, doctoral students may be required to demonstrate competence in one or more foreign languages and/or special skills.

Advance to Candidacy: In addition to course requirements, students must also pass a language exam, pass the Major Field written exam, an oral exam, and pass the Prospectus Defense.

Students who enter with a master's degree in history or a related field are expected to sit for a set of written and oral comprehensive examinations within five semesters. Those who enter with a bachelor's degree typically

take the comprehensive exams within six semesters. Upon successful completion of all examinations, doctoral students are expected to prepare a dissertation prospectus and advance to doctoral candidacy within one or two semesters.

Post-Candidacy: Complete at least 12 credits of HIST899 doctoral dissertation research as well as successfully defend and submit an original dissertation.

The requirements for the doctoral degree are intended to be completed in five to six years. For more information, see the History Department website.

Course	Title	Credits
HIST601	History and Contemporary Theory	3
General Seminar in Major Field		3
Three readings courses in Major Field		9
Three readings courses in the Minor Field		9
Two Research Seminars		6
Dissertation Research Requirement		
HIST899	Doctoral Dissertation Research	12
Total Credits		**42**

History (HIST)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of History offers programs leading to the degrees of Master of Arts and Doctor of Philosophy. In conjunction with the College of Information Studies, the Department of History also offers a dual-degree Master of Arts in History and Library Science. In conjunction with the School of Architecture, Planning, and Preservation the Department of History also offers a dual-degree Master of Arts in History and Historic Preservation.

Major fields of concentration for the MA and PhD programs are: Ancient Mediterranean, Medieval, Early Modern Europe, Modern Europe, Global Interaction and Exchange, International, Jewish, Latin America, Middle East, Russia & Eurasia, Technology, Science, & Environment, the United States, and Women & Gender. MA-only fields are: Africa and Military. The graduate program, which includes over fifty regular faculty members and approximately 150 degree-seeking students, excels in the following subfields: African-American, US, and Middle East. Other areas of established strength are Western and Central Europe, Russia and Eurasia, Ancient Mediterranean, Latin American, and Women & Gender. More recently, the following fields have emerged as centers of growing faculty strength and are attracting increasing numbers of students and faculty: Atlantic history, the African diaspora, and Global Interaction and Exchange.

The students in our four-degree programs come from across the nation, from small liberal arts colleges and major research institutions, as well as from Europe, Canada, East Asia, Eurasia, and Latin America. History students have won a number of major external fellowships, including the ACLS/Mellon Early Career Fellowship, the Fulbright-Hays Doctoral Research Fellowship, the Berlin Program for Advanced German and European Studies Dissertation Fellowship, the Foundation for the Research and Study of the East German Dictatorship Fellowship, the Fulbright-IIE Student Grant, the International Research & Exchanges Board Fellowship, the Mary Savage Snouffer Dissertation Fellowship, the Library Company of Philadelphia Fellowship, the Maryland Historical Society Lord Baltimore Research Fellowship, the Massachusetts Historical Society Research Fellowship, the Center for Jewish History Fellowship, and the Mellon Fellowship for Dissertation Research in Original Sources.

Recent graduates have started postdoctoral fellowships or tenure-track jobs at institutions that include Case Western University, George Washington University, Bucknell University, Claremont-McKenna College,Christopher Newport University, Morgan State University, Johns Hopkins University, Monash University, Appalachian State University, Montclair State University, Ohio University, Rhode Island College, SUNY Purchase, the United States Naval Academy, the University of South Florida, Framingham State University, the University of Southern Mississippi, and Western Washington University. The members of our extended alumni community, numbering more than 300 master of arts and doctoral recipients, work as professional historians throughout the State of Maryland, in a number of United States Government agencies, and at institutions of higher education and historical research across the United States and the globe.

Financial Assistance

The Department of History administers several forms of financial assistance for graduate students, including fellowships, teaching assistantships, graduate assistantships, research assistantships, and research grants. All fellowships, assistantships, and grants are awarded on the basis of merit, as determined by the Graduate Committee, upon the recommendation of faculty and the Director of Graduate Studies.

A multiyear guarantee of continuous funding is frequently offered to newly matriculating PhD students. Guaranteed funding is not standard for students entering the MA and HiLS programs.

Funding packages typically include two years of fellowship and three years of Teaching Assistantship. The packages include tuition remission and a health benefits option, subject to satisfactory progress towards the fulfillment of program requirements. All teaching assistants receive tuition remission and a health benefits option.

For FY21 (2020-21 academic year), the pay scale for 9.5-month teaching, graduate, and research assistantships range between $19,225.80 and $20,060.00. Fellowships follow a similar pay scale. Assistantships and fellowships include tuition remission and a health benefits option. Variations in stipend amounts are due to a number of factors, including the type of appointment, international student status, previous appointments, and advancement to candidacy.

Additional funding is available through the Arts and Humanities Research and Travel Grant competition, Department semester dissertation fellowships, Department summer research award, matching funds for travel to academic conferences, and various campus-wide funding competitions. All doctoral students are expected to seek outside funding for pre-dissertation and dissertation research, as appropriate.

History graduate students may seek grants and fellowships, assistantships, hourly employment, and other forms of self-support offered by non-departmental sources.

Contact

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Associate Professor

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Website: http://www.history.umd.edu

Courses: HIST

Admissions
General Requirements

- Statement of Purpose: Other than the required questions for the Statement of Purpose asked by the University of Maryland, the History Department asks applicants to include content that emphasizes academic and research interests:
  a. what is the applicant interested in studying and why,
  b. what the applicant might be interested in working on for the M.A. thesis or Ph.D. dissertation and
  c. how the applicant's prior education has provided good training for graduate work in the particular field of interest.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample: Research paper of about 20 pages, uploaded to the Upload Requirements section of the application.
- Description of Research/Work Experience

As a demonstration of our commitment to excellence in historical scholarship and education, admission to our degree programs is highly competitive. It is important that each applicant clearly articulate his/her academic preparation and qualifications for graduate study at Maryland. All prospective applicants are encouraged to make contact with the faculty in the area(s) of interest. Faculty play an important role in the admissions decision. Prospective applicants are also encouraged to make contact with current graduate students to learn more about their experiences. The History Graduate Student Association can facilitate communications with current students.

Although there are exceptions, the minimum overall grade point average is 3.25 for admission to a master's degree program and 3.50 for admission to the doctoral program. The admissions committee would typically expect a higher grade point average in past coursework in history and related disciplines.

There is no language requirement for the MA degree, but the command of one or more languages is required for admission into the PhD program in some fields within History. For more information on language requirements, see the History Department website.

The University requires that all admitted students demonstrate proficiency in written and spoken English.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 1, 2021

RESOURCES AND LINKS:
Program Website: http://www.history.umd.edu
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- History, Doctor of Philosophy (Ph.D.) (p. 238)
- History, Master of Arts (M.A.) (p. 238)

Facilities and Special Resources

In addition to the field concentrations described above, the Department of History offers several forms of specialized training, including certificate programs in Museum Scholarship & Material Culture, co-sponsored by the Department of American Studies, and Historic Preservation, co-sponsored by the School of Architecture.

The Nathan and Jeanette Miller Center for Historical Studies, housed within the Department, promotes both research and graduate training by sponsoring seminars and colloquia, major scholarly conferences, and visiting professors who teach graduate courses. Typically, the Center's activities each year concentrate on a historical theme of surpassing interests that cuts across the usual chronological and cultural boundaries.

The University of Maryland is home to a number of important archives, special collections, and historical editing projects, including the archives of the American Federation of Labor-Congress of Industrial Organizations (AFL-CIO), the Freedmen and Southern Society Project and the Samuel Gompers Papers, the Library of American Broadcasting, the Gordon W. Prange Collection, and the National Trust for Historic Preservation Library. The Combined Caesarea Expeditions, an archeological project that joins excavation of the terrestrial remains of Caesarea Maritima with underwater investigation of the site's ancient harbor, are coordinated at Maryland.

The University sponsors a number of significant scholarly publications of interest to historians, including the *Hispanic American Historical Review*, the flagship English-language journal in Latin American history; and *Feminist Studies*, a pioneer in women's history and gender studies.

The College Park campus is located within the Washington-Baltimore corridor, one of the nation's most dynamic regions for historical research. Francis Scott Key Hall, home to the Department of History, sits less than ten minutes from Archives II, the U.S. government's largest repository, and less than thirty minutes from downtown Washington, D.C., a city of unparalleled cultural resources and unique opportunities for historical research, including the Library of Congress, the Folger, and the US

Holocaust Memorial Museum. Annapolis and Baltimore, home to significant archival holdings related to the history and cultures of the State of Maryland, the greater Chesapeake Bay region, and the Atlantic world, can be reached in less than forty-five minutes.

History and Library & Information Science, Master of Arts and Master of Library and Information Science (dual degree) (M.A. and M.L.I.S.)

Thesis option: minimum of 54 credits
Non-thesis option: minimum of 54 credits

Students must complete a minimum of 24 credits in the Department of History and a minimum of 24 credits in the College of Information Studies. Students have the option of specializing in one of the iSchool's specializations: Archives and Digital Curation, Community Analytics and Policy, Youth Experience, Diversity and Inclusion, or an Individualized Program Plan. Students completing a thesis must take 6 credits of HIST799.

Course	Title	Credits
Library and Information Science requirements:		
LBSC602	Serving Information Needs	3
LBSC631	Achieving Organizational Excellence	3
LBSC671	The Lifecycle of Information	3
LBSC791	Designing Principled Inquiry	3
LBSC703	Field Study in Archives and Digital Curation	3
or LBSC707	Field Study in Information Service	
iSchool electives		9
History requirements:		
HIST601	History and Contemporary Theory	3
Approved major field courses		9
General Seminar or Major Field course		3
HIST8xx Research Seminar		3
Thesis and Non-thesis option		**6**
Thesis option:		
HIST799		
Non-thesis option:		
Additional Major Field course		
800-level Research Seminar		
Remainder of coursework in either Library and Information Science or History (chosen with advisor)		**6**
Total Credits		**54**

History and Library & Information Science (HILS)

Graduate Degree Program
College: Information Studies / Arts and Humanities

Abstract

The History and Library Science (HiLS) dual-degree program is the result of a cooperative agreement between the College of Information Studies, (Maryland's iSchool) and the Department of History. HiLS students graduate with both a Master of Arts in History and a Master of Library and Information Science (MLIS) degree.

The HiLS program is ideally suited for students interested in gaining a multidisciplinary perspective to research as well as practical hands-on skills. Because of the proximity of the College Park campus to a variety of immensely rich research collections, students are able to gain first-hand experiences through internships that reinforce their classroom instruction. As a result of the dual-degree studies, students in the HiLS program gain skills in historical methodology and cutting-edge library and information science practices, preparing them for careers in libraries, archives, museums, and other information centers in the public, private, and non-profit sectors.

Students admitted to the HiLS Program typically complete the program of study in three (3) years, however they have up to five (5) years to complete the degrees. The HiLS program requires fifty-four (54) credit hours of study, with a minimum of twenty-four (24) hours in both the Department of History and the College of Information Studies. Students select how to use the remaining six (6) credits.

The MA and the MLIS are awarded simultaneously, and a student who fails to complete the special requirements for the coordinated degree programs may not receive either degree. When a student admitted to the HILS program subsequently wishes to receive only one degree, he/she must transfer from HILS either to the graduate program in History or to the College of Information Studies and fulfill the normal requirements for the separate master's degree. The dual-degree History and Library Science offers the option of a degree-by-thesis (History and iSchool) as well as a degree-by-examination (History).

Financial Assistance

The College of Information Studies and the Department of History make available a limited number of teaching and/or graduate assistantships for master's students, including students in the HILS dual-degree program. These assistantships are awarded on the basis of merit, staffing needs, and budget. Neither academic unit extends guaranteed awards.

For more information on financial aid options from the College of Information Studies, please visit the Financial Aid section of the College of Information Studies website. (http://ischool.umd.edu/)

Contact

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Websites: http://www.history.umd.edu **or** https://ischool.umd.edu/

Courses: HIST **(**https://umd-curr.courseleaf.com/graduate/courses/hist/**)** LBSC **(**https://umd-curr.courseleaf.com/graduate/courses/lbsc/**)** INFM **(**https://umd-curr.courseleaf.com/graduate/courses/infm/**)**

Relationships: Human-Computer Interaction (HCIM) **(**p. 243**)** Information Management (INFM) **(**p. 249**)** Information Management (online) (MIMO) **(**p. 251**)** Information Studies (INFS) **(**p. 252**)** Library and Information Science (LBSC) **(**p. 271**)** Library and Information Science (online) (LBSO) **(**p. 273**)**

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT) (optional)
- CV/Resume
- Supplementary Essay (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationhilsdual.pdf)
- Writing Sample (Optional)
- Portfolio PDF Upload (optional)

Students must apply for admission to both the Department of History and the College of Information Studies under the rubric HILS (History and Library Science). There is one, consolidated application, but two, independent admission decisions. An offer of admission from both, the Department of History and the College of Information Studies is required in order to be admitted to the dual-degree program.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 21, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 21, 2022

RESOURCES AND LINKS:

Program Website: http://www.history.umd.edu or http://www.ischool.umd.edu
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- History and Library & Information Science, Master of Arts and Master of Library and Information Science (dual degree) (M.A. and M.L.I.S.) (p. 241)

Facilities and Special Resources

The College of Information Studies operates five research centers: the Human-Computer Interaction Lab (HCIL), the Information Policy and Access Center (iPAC), and the Center for Advanced Study of Communities and Information (CASCI), the Cloud Computing Center (CCC), and the Digital Curation Innovation Center. iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS), the Maryland Institute for Technology in the Humanities (MITH), and the Computational Linguistics and Information Processing Laboratory (CLIP), as well as the Departments of Computer Science, English, and Sociology, the Robert H. Smith School of Business, and the College of Education. The College also operates a student computer lab for currently enrolled students. Faculty and students participate in cooperative research with staff of the University Libraries, the Human-Computer Interaction Laboratory, and other campus units. Students have access through cooperative arrangements and programs to the resources of Archives II, the National Agricultural Library, the Library of Congress, and other prominent research facilities.

Housing, Finance & Development, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Housing, Finance & Development (Z007)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Housing, Finance & Development, Post-Baccalaureate Certificate (P.B.C.) (p. 242)

Human-Computer Interaction, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option: 30 credits

The Master of Science in Human Computer Interaction (HCIM) is a unique cross disciplinary degree program that integrates information studies, computer science, education, psychology and engineering to prepare future HCI leaders in industry, government, education and other sectors. Through coursework and research experiences, students in this program will develop skills in the fundamentals of HCI, advanced research methods, usability analysis and testing, social computing strategies and technologies, and technology design.

HCIM students devise a plan of study to meet graduation requirements: three core courses, a required research methods course and internship experience, a thesis or capstone project, and three elective courses for a total of 30 credit hours. Students will take 9 credits of elective courses in the following areas: Information Policy, Information Ethics, Users and Use Context, Information and Universal Usability, Information Environments.

Students who wish to complete a thesis should enroll in six credits of INST799. These credits must be taken as 3 credits in the fall of the student's final year and 3 credits the following spring.
Students who wish to complete a capstone project should enroll in INST775 (3 credits) and INST776 (3 credits). These courses must be taken consecutively in the fall and spring of the student's final year.

Course	Title	Credits
INST630	Introduction to Programming for the Information Professional	3
INST632	Human-Computer Interaction Design Methods	3
INST633	Analyzing Social Networks and Social Media	3
INST717	Internship Practicum in Human-Computer Interactions	3
Research Methods course		3
Elective courses		9
Thesis or Non-Thesis Requirements		
Select one of the following:		6
Thesis:		
INST799	Master's Thesis Research	
Non-Thesis:		
INST775	HCIM CAPSTONE PREP	
INST776	HCIM CAPSTONE PROJECT	
Total Credits		**30**

Human-Computer Interaction (HCIM)

Graduate Degree Program
College: Information Studies

Abstract

In the HCIM program, students learn to design, evaluate, and implement new information technologies that are understandable, usable, and appealing to a wide variety of people. Our students develop a fundamental understanding of the technology design process, tool-building technologies, evaluation techniques, application areas for users, and the social impact of technology on the individual and community. The program prepares students to become human-computer interaction (HCI) leaders in industry and government, or to become successful in doctoral work in a particular specialization of HCI.

Our 30-credit program is typically completed in two years by full-time students, while offering flexibility to accommodate part-time and professional students. Our core curriculum grounds students in the fundamentals of HCI perspectives and methodologies, while electives offer in-depth insight into specialized areas of the field. Students are free to spend the summer in between working at an internship they secure, volunteering, taking courses, or developing their own projects of interest. The choice of an individual thesis or a client-based team capstone project allows students to demonstrate the skills they've acquired in the form best suited to their career goals.

Financial Assistance

The HCIM program is not able to offer applicants financial aid on admission. Many of our students apply for and secure graduate assistantships after being admitted to the program, but these positions are administered by individual faculty, departments, and offices, not by the program itself. For more information about scholarships and financial aid offered by the College of Information Studies, please see here (https://ischool.umd.edu/academics/tuition-fees-graduate/).

Contact

For more information about applying to the HCIM program (https://ischool.umd.edu/academics/master-of-science-in-human-computer-interaction/admissions/), please contact Dustin Smith, the HCIM program's academic advisor, at hcim@umd.edu.

Please visit the College of Information Studies website (http://ischool.umd.edu/) for details on upcoming Information Sessions (https://academiccatalog.umd.eduHTTPS://ISCHOOL.UMD.EDU/ACADEMICS/VIRTUAL-INFO-SESSIONS/) or Open House programs.

iSchool Student Services Office
4110 Hornbake Building, South Wing
4130 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2038
Email: hcim@umd.edu

Website: http://www.ischool.umd.edu/hcim (http://www.ischool.umd.edu/hcim/)

Courses: INFM (https://umd-curr.courseleaf.com/graduate/courses/infm/) INST (https://umd-curr.courseleaf.com/graduate/courses/inst/)

Relationships: Information Management (INFM) (p. 249) Information Studies (INFS) (p. 252) Library and Information Science (LBSC) (p. 271) Library and Information Science (online) (LBSO) (p. 273)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s): Uploading unofficial transcripts is sufficient for the purposes of the application review process. However, if you are offered admission and choose to enroll in the University of Maryland, you will need to provide an official and unopened transcript.
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE): GRE scores are optional for domestic applicants, and required for international applicants. Any requests to waive the GRE requirement will be evaluated on a case-by-case basis by the program committee. Applicants may also submit GMAT scores instead of GRE scores. GMAT scores may also be submitted instead of GRE scores (please notify the department if you will be sending GMAT scores). Please send any requests to hcim@umd.edu.
- GRE Subject (optional)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationhcim2020.pdf)
- Publications/Presentations (optional)

All applicants to the College of Information Studies must meet the minimum requirements set by the University of Maryland Graduate School.

- Applicants must have earned a four-year baccalaureate degree from a regionally accredited U.S. institution, or an equivalent degree from a non-U.S. institution.
- Applicants must have earned a minimum 3.0 average GPA (on a 4.0 scale) in all prior undergraduate course work.
- Applicants must provide an official copy of a transcript for all their post-secondary work.

Admission to the HCIM program is competitive. Applicants are evaluated for admission to the program based primarily on academic achievement (GPA and prior coursework) and admissions essays. TOEFL score should be 100 or higher. GRE should be in the 40th percentile or higher for Verbal scores and in the 60th percentile or higher for Qualitative scores.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 14, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 14, 2022

RESOURCES AND LINKS:
Program Website: https://ischool.umd.edu/
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Human-Computer Interaction, Master of Science (M.S.) (p. 243)

Facilities and Special Resources

The College operates six research centers: the Human-Computer Interaction Lab (HCIL), the Information Policy and Access Center (iPAC), and the Center for Advanced Study of Communities and Information (CASCI), the Cloud Computing Center (CCC), the Trace Center, and the Digital Curation Innovation Center (DCIC).

iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS), the Maryland Institute for Technology in the Humanities (MITH), and the Computational Linguistics and Information Processing Laboratory (CLIP), as well as the Departments of Computer Science, English, and Sociology, the Robert H. Smith School of Business, the College of Education, and the Philip Merrill College of Journalism.

Human Development, Master of Arts (M.A.)

Thesis or Non-thesis option: 30 credits

The M.A. program requires 30 credit hours and offers both a thesis option (24 hours of courses plus 6 hours of thesis) and a non-thesis option (24 hours of courses plus 6 hours of supervised placement in an organization and accompanying papers).Courses in biological, social, cognitive, and personality development and in quantitative methods and a written comprehensive examination are required for all master's degrees.

Course	Title	Credits
Required courses:		
EDHD690	Theoretical Foundations of Human Development	3
EDMS645	Quantitative Research Methods I	3
EDHD720	Social Development and Socialization Processes	3
EDHD721	Cognitive Development and Learning: An Introduction	3
EDHD775	Human Development and Neuroscience	3
Thesis or Non-Thesis Requirements		
Select one of the following:		15
Thesis:		
EDMS646	General Linear Models I	
EDHD799	Master's Thesis Research	
Two electives approved by advisor		
Non-Thesis:		
EDHD789	Internship in Human Development	
Three electives approved by advisor		
Total Credits		**30**

Human Development, Master of Education (M.Ed.)

Non-thesis only: 30 credits required

The Master of Education degree in Human Development has the following requirements: Minimum of 30 credits of coursework, including EDMS645. A minimum of 15 hours in courses numbered 600-800, with the remainder in the 400 series or above. Required courses focus on biological, social, cognitive, and personality development and in quantitative methods. A written comprehensive examination and seminar paper are required to be taken at the end of the coursework.

The Off Campus Master of Education program curriculum is designed to respond to developmental and motivational challenges faced by teachers and other professionals who work with children and adolescents in education settings. This is not a certification program. The program uses a cohort model. Each fall a new cohort of students begins the program, which runs for two years, including one summer semester. To graduate, students must successfully complete 30 credits of study and a seminar paper. Classes are held off campus, primarily at the Universities at Shady Grove. For More information, please visit https://education.umd.edu/human-development-program#prospective-graduate-students (https://education.umd.edu/human-development-program/#prospective-graduate-students)

Course	Title	Credits
Required courses:		
EDHD690	Theoretical Foundations of Human Development	3
EDMS645	Quantitative Research Methods I	3
EDHD720	Social Development and Socialization Processes	3
EDHD721	Cognitive Development and Learning: An Introduction	3
EDHD775	Human Development and Neuroscience	3
Select five of the following:		15
EDHD711	Peer-Culture and Group Processes in Human Development	
EDHD750	Culture, Context, and Development	
EDHD779	Selected Topics in Human Development	
EDHD835	The Development of Achievement Motivation	
EDHD840	Language and Literacy Development	
EDHD850	Social Cognition and Moral Reasoning	
Total Credits		**30**

Human Development, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 72 credits, including 12 credits of EDHD899. Students can specialize in either Educational Psychology or Developmental Science, and must complete an Independent Emprical Research Project as well as The Doctoral Comprehensive Knowledge Portfolio.

Courses in biological, social, and cognitive development and in intermediate statistics and research methods are required. Students also receive credit for research experiences. Slight modifications of these requirements characterize the Specializations in Educational Psychology and Developmental Sciences.

Advance to Candidacy: In addition to coursework requirements, students must complete an independent empirical research project as well as successfully complete a comprehensive examination portfolio.

Post-Candidacy: Students must complete at least 12 credits of 899 Doctoral Dissertation Research and successfully defend and submit an original dissertation.

Course	Title	Credits
Required courses:		
EDMS651	General Linear Models II	3
EDHD780	Research Methods in Human Development	3
EDHD888	Apprenticeship in Human Development Research	3-12
EDMS646	General Linear Models I	3
EDHD720	Social Development and Socialization Processes	3
EDHD721	Cognitive Development and Learning: An Introduction	3
EDHD775	Human Development and Neuroscience	3
EDMS elective		3
Dissertation Research Requirement		
EDHD899	Doctoral Dissertation Research	12
Select one of the specializations below		**27**
Educational Psychology		
EDHD760	Advanced Educational Psychology	
EDHD835	The Development of Achievement Motivation	
Electives		
Developmental Science		
EDHD690	Theoretical Foundations of Human Development	
EDHD629	Seminar for the Center for Children, Relationships, and Culture	
Electives		

Human Development (EDHD)

Graduate Degree Program
College: Education

Abstract

The purposes of the Human Development graduate programs are to contribute to basic knowledge about human development and learning and apply this knowledge in various settings. The general areas of human development covered in courses and research include infant and early childhood development, child development, and adolescent development. Specific faculty areas of expertise and research include achievement motivation, cognitive development, developmental neuroscience, early childhood policy, intergroup attitudes and relationships, language development, literacy development, peer relationships, moral development, social development, temperament, parenting, prejudice and discrimination, and the role of culture on many aspects of development.

Graduate programs in Human Development lead to the Master of Education, Master of Arts, and Doctor of Philosophy degrees. The research-oriented M. A. (with thesis) and the Ph.D. degree programs in human development are designed to develop students' scientific knowledge of human development and ability to carry out original empirical research projects. The M.Ed. and M.A. without thesis programs are designed to develop competencies in identifying implications of the scientific knowledge of human development for specific situations and contexts, particularly elementary and secondary schools.

Human Development offers two specialization areas of study at the doctoral level, Developmental Science and Educational Psychology. The graduate programs and specializations prepare graduates for faculty positions at universities or research positions at institutions where research in developmental science and educational psychology is conducted. Graduates of our program have obtained positions as university professors, research scientists, program analysts, and other research-oriented occupations including research-oriented professionals in private, policy, or advocacy organizations.

Financial Assistance

Students requesting consideration for Financial Aid, in addition to completing the financial aid form found in the Graduate Admissions application, must submit their application by the priority deadline. All students who submit their application by December 8, 2021 (domestic) and December 1 (international) will automatically be reviewed for any departmental aid. University fellowships and Departmental assistantships are awarded on a competitive basis -- more students are admitted than can be awarded funding. In recent years, only students with undergraduate GPA's of 3.6, outstanding research experience, and strong letters of recommendation from academic references have been successful in obtaining Recruitment Fellowships sponsored by the Graduate School and graduate assistantships in the Department.

First priority for Departmental assistantships goes to students already admitted to the Department who have been assured financial assistance for the full course of their study. Almost all awards of fellowships and assistantships are based on previous academic performance, with little attention to need. In addition, some faculty have external grants which provide support for graduate students. Students who do not receive a fellowship or assistantship from the Department may contact the University Financial Aid office at 301-314-9000 for information about other sources of financial support.

Contact

Jannitta Graham
Graduate Coordinator
Department of Human Development and Quantitative Methodology
3304 Benjamin Building
3942 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.8432
Fax: 301.405.2891
Email: humandev@umd.edu

Website: http://www.education.umd.edu/HDQM/ **for the HDQM department. For the Human Development program: https://education.umd.edu/human-development-program.**

Courses: EDHD **(**https://umd-curr.courseleaf.com/graduate/courses/edhd/**)** EDMS **(**https://umd-curr.courseleaf.com/graduate/courses/edms/**)**

Relationships: Neurosciences and Cognitive Science (NACS) **(**p. 312**)**

Admissions

ON-CAMPUS ADMISSIONS INFORMATION

General Requirements

- Statement of Purpose
- Transcript(s): Please note: EDHD requires all applicants to submit official transcripts (hard copies) to: University of Maryland, College Park, Enrollment Services Operation/Graduate Admissions, Room 0130 Mitchell Building, College Park, MD 20742
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)* Graduate Record Examination (GRE) scores are not considered as a criterion for admission into the program. GRE scores that are submitted are made available to potential faculty advisors.
- CV/Resume
- Description of Research/Work Experience (M.A. only)
- Writing Sample (required for M.A. and Ph.D., not required for M.Ed.)

The College of Education and Graduate School require a minimum GPA of 3.0 (on a 4.0 scale) at the undergraduate level. At the master's level, a minimum GPA of 3.5 is required by the College of Education. The general Graduate Record Exam (GRE) is required by the Department. Three letters of recommendation including evidence of academic potential from university faculty references are required. In addition, students must write a statement of purpose which indicates a match between student research interests and faculty expertise. Students should indicate their research interests, describe any relevant research experience, and how their experience and interests can be met by our program.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	December 8, 2021	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 1, 2021	N/A

RESOURCES AND LINKS:

Program Website: http://www.education.umd.edu/HDQM/
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

OFF-CAMPUS M.ED. ADMISSIONS INFORMATION

The Department of Human Development & Quantitative Methodology (HDQM) at the University of Maryland will begin accepting applications on **July 1, 2021** for the Fall 2022 cohort of the off - campus, 30 credit

Master of Education in Human Development program. Applications will be reviewed on a rolling basis and close on **June 1, 2022**.

Please contact Dr. Lauren Trakhman, Director of Outreach, at trakhman@umd.edu or Ms. Jannitta Graham, HDQM Graduate Coordinator, at jgraham7@umd.edu for further information or with any questions.

Admissions Requirements

- Non-refundable $75 application fee*
- Complete a graduate student on-line application, including
  - Scanned transcripts showing receipt of a bachelor's degree from an accredited institution with an undergraduate GPA of 3.0 or higher (on a 4.0 scale). If you have international credentials, please provide transcript in original language with English translation, diploma and certificate. You may be required to submit TOEFL exam scores, https://gradschool.umd.edu/admissions/international-admissions (https://gradschool.umd.edu/admissions/international-admissions/)
    - **Note:** Official transcripts are required by the Graduate School for the final admission decision. If accepted into the University and program, applicants must send official, sealed undergraduate and graduate transcripts from all post-secondary schools attended (with 9 credits or more). Transcript(s) from the institution should be mailed to University of Maryland College Park Enrollment Services Operation, Attn: Graduate Admissions, Room 0130 Mitchell Building, College Park, MD 20742
  - 3 letters of recommendation
  - Statement of purpose
  - Evidence of having taken a college-level statistics class in the last five years with a grade of B- or above. If you have not, please indicate this in your statement of purpose and you will work with Dr. Trakhman to take a statistics course online in the summer before the program begins

* Subject to increase. If you were previously admitted as a Graduate Student, registered, AND completed at least one semester, you will not be charged a second application fee. To obtain a waiver you will need to indicate your previous graduate student status within the online graduate application. In the "Previous Institution" section of the application, when you enter "UMCP", a waiver link will appear within the application. You will click on the link and be asked to certify that you previously attended the university. However, you must complete all of the paperwork for admission, as you now are entering a degree program through a new department. You must request the waiver before submitting the application.

Requirements

- Human Development, Doctor of Philosophy (Ph.D.) (p. 245)
- Human Development, Master of Arts (M.A.) (p. 244)
- Human Development, Master of Education (M.Ed.) (p. 244)
- Human Development, Master of Education (off campus, M.Ed.) (https://academiccatalog.umd.edu/graduate/programs/human-development-edhd/off-campus-med/)

Facilities and Special Resources

The Washington, D.C. area and the University of Maryland are rich in resources for graduate study in human development. The faculty of the Department is multi-disciplinary, representing the broad range of developmental sciences, educational psychology, and related fields. There are programs of funded research, field service programs, and internship experiences available in cooperation with agencies and schools. The Department sponsors the Center for the Study of Children, Relationships, and Culture and manages the on-campus Center for Young Children. Faculty in the department make use of the research facilities at the Maryland Neuroimaging Center and Maryland Language Science Center. Students in the College of Education have access to the latest technology through Educational Technology Services.

Human Development Education, Certificate of Advanced Study (C.A.S.)

This certificate is not currently accepting applications.

Human Development Education (Z903)

Graduate Certificate Program
College: Education

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.education.umd.edu

Admissions

Please visit the department website for more information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Human Development Education, Certificate of Advanced Study (C.A.S.) (p. 247)

Industrial/Organizational Psychology (MPIO)

Graduate Degree Program

College: Behavioral and Social Sciences

Abstract

The University of Maryland Master's of Professional Studies in Industrial Organizational Psychology provides rigorous training in the scientific principles and methods in IO Psychology while also increasing graduates' capacity to influence the way work is done, to apply evidence-based best practices, and to ask and answer questions that matter in the workplace. Students take 10 courses (two per term) over the course of 15 months. Courses are taught in the evenings at the College Park campus and through pre-recorded online lectures. This program is designed for working professionals who desire advanced knowledge in industrial and organizational psychology to enter, advance, or expand their career options.

Contact

Paul Hanges
Academic Program Director
3147G Biology-Psychology Building
4094 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5930
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Nikita Arun

Program Director

1121 Biology-Psychology Building

4094 Campus Drive

University of Maryland

College Park, MD 20742

Telephone: 301.405.5862

Email:narun@umd.edu (Email%3Anarun@umd.edu)

Website: http://iop.umd.edu/

Courses: PSYC (p. 937)

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmpio.pdf)
- Writing Samples (optional, up to 2)
- Description of Research/Work Experience (optional)
- Portfolio PDF Upload (optional)
- Admissions interview

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	March 1, 2022	February 1, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	March 1, 2022	N/A

Other Deadlines: Please visit the program website at http://ter.ps/iopsych (http://ter.ps/iopsych/)

Requirements

- Industrial/Organizational Psychology, Master of Professional Studies (M.P.S.) (p. 248)

Facilities and Special Resources

Courses follow a blended format with classes taking place both face to face and online. In person classes are held at the College Park campus in the evenings.

Industrial/Organizational Psychology, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits required

Course	Title	Credits
Required courses:		
PSYC652	Analytical Thinking: Statistical Methods at Work	3
PSYC603	Introduction to Industrial and Organizational Psychology	3
PSYC653	The Business of Evaluation: Research Methods at Work	3
PSYC732	Selection and Classification Issues in Organizations	3
PSYC654	Advanced Analytical Thinking: Statistical Methods at Work II	3
PSYC655	Talent Development	3
PSYC656	Business Fundamentals and Legal Issues facing Organizations	3
PSYC657	Managing Strategic Organizational Change	3
PSYC661	Practicum in IO Psychology	3
PSYC660	Performance Management, Compensation, and Benefits	3
Total Credits		**30**

Information Assurance Management (Z026)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.oes.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oes.umd.edu

Requirements

- Information Assurance Management, Post-Baccalaureate Certificate (P.B.C.) (p. 249)

Information Assurance Management, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Information Management (INFM)

Graduate Degree Program
College: Information Studies

Abstract

The Master of Information Management (https://ischool.umd.edu/mim/) (MIM) program at the College of Information Studies, Maryland's iSchool prepares graduates to be industry leaders in information science and technology, maximizing the value of information management solutions and empowering organizations through the optimized decision-making process. Drawing from management, computer science, information systems, and information science, the MIM program provides students with the skills and knowledge necessary to successfully meet users' information needs, lead efforts to develop organizations' information management capabilities, develop and deploy emerging technologies, and manage high-value information resources.

The specific goals of the MIM program are to:

- Prepare professionals for leadership positions that bridge the gap between technology-oriented staff, functional personnel, and management;
- Address the growing need for skilled information professionals who can strategically manage information and technology assets to fulfill critical information needs in organizations;
- Provide leadership in the information management field through the study of ethical, political, social, and technical issues related to information management in modern society;
- Assist organizations in the formation of information policies, development and application of information systems and services, and the use of information management technologies and methods.

The MIM curriculum consists of 36 credits (12 courses) of graduate-level coursework in information management and related subjects, including a balanced mix of required and elective courses. The courses are integrated into four main blocks:

- Core courses provide a foundation of skills and knowledge related to information, technology, user analysis, and management. They are also opportunities for students to determine which aspects of information management they find most interesting and useful.
- Specialized courses in Management and Information Technology enable students to build advanced skills and knowledge and develop the expertise required in the information management field;
- Practicum courses allow students to connect theory from their learning experience in the classroom to real-world settings through projects carried out in partner organizations;
- Elective courses provide flexibility to the program and allow students to pursue their own educational and professional interests in greater depth.

The Master of Information Management degree courses are offered at the College Park campus (College Park, Maryland), at the Universities at Shady Grove campus (Rockville, Maryland), and online.

Financial Assistance

For more information on merit-based aid, please visit the Financial Aid (https://ischool.umd.edu/academics/tuition-fees-graduate/) section of the College of Information Studies website (http://ischool.umd.edu/).

Contact

For more information about applying to the MIM program (http://ischool.umd.edu/mim-admissions/), please contact us at mimprogram@umd.edu.

Please visit the College of Information Studies website (http://ischool.umd.edu/) for details on upcoming Information Sessions (https://ischool.umd.edu/academics/virtual-info-sessions/) or Open House programs.

College of Information Studies
4110 Hornbake Building, South Wing
7130 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2038
Fax: 301.314.9145
Email: mimprogram@umd.edu

Website: https://ischool.umd.edu/mim (https://academiccatalog.umd.edu/graduate/programs/information-management-infm/ischool.umd.edu/mim/)

Courses: INFM (https://umd-curr.courseleaf.com/graduate/courses/infm/) INST (https://umd-curr.courseleaf.com/graduate/courses/inst/)

Relationships: Curation and Management of Digital Assets (online) (Z093) (p. 152) Human-Computer Interaction (HCIM) (p. 243) Information Management (INFM) (p. 249) Information Studies (INFS) (p. 252) Library and Information Science (LBSC) (p. 271) Library and Information Science (online) (LBSO) (p. 273) Certificate in Information Risk, Privacy, and Security (https://ischool.umd.edu/academics/certificate-in-information-risk-privacy-security/) (Z139); Game, Entertainment, and Media Analytics (GEM) (https://ischool.umd.edu/academics/game-entertainment-media-analytics/) Dual Masters in Information Management and Community Planning (CPIM) (https://ischool.umd.edu/academics/mim-community-planning-dual-degree/)

Admissions

General Requirements

- Statement of Purpose:
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/)): The minimum TOEFL score for admission into the MIM program is 96. Students must be eligible for full enrollment.

Program-Specific Requirements

- Letters of Recommendation (3)
- GRE scores are required for all applicants, except domestic applicants with an undergraduate GPA of 3.25 or higher. Any requests to waive the GRE requirement will be evaluated on a case-by-case basis by the program committee. GMAT scores may also be submitted instead of GRE scores (please notify the department if you will be sending GMAT scores). Please send any requests to mimprogrammanager@umd.edu.
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationinfm.pdf): Please note: Though the responses to these questions may have some overlap with the Graduate School's statement of purpose – applicants may cut and paste, as relevant, from the Graduate School's statement submission.

The admissions process for the MIM program is designed to determine whether the program is a good fit considering the applicant's background, education, and professional development goals. Applications for admission to MIM program are evaluated on the basis of the following criteria:

- A baccalaureate degree from a regionally accredited college or university with a minimum "B" or 3.0 average on a 4.0 scale on all academic work attempted for consideration;
- Strength of the three (3) recommendations from persons able to judge probable success in graduate school;
- Strength of applicant statement of purpose, explaining the reasons for undertaking the graduate study at the University of Maryland;
- Strength of supplemental application responses, describing why you are interested in the Masters of Information Management program and why this program is a good fit for your professional/career goals;
- International applicants are required to submit the TOEFL or IELTS scores;
- Potential for leadership and innovation in information management as reflect in previously earned graduate degrees and work experience;

Please visit the MIM Admission (https://ischool.umd.edu/academics/master-of-information-management/admissions/) page for more information about applying to the MIM program.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	February 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	February 1, 2022

RESOURCES AND LINKS:
Program Website: https://ischool.umd.edu/
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Information Management, Master of Information Management (M.I.M.) (p. 250)

Facilities and Special Resources

The College operates six research centers: the Human-Computer Interaction Lab (HCIL), the Information Policy and Access Center (iPAC), and the Center for Advanced Study of Communities and Information (CASCI), the Cloud Computing Center (CCC), the Trace Center, and the Digital Curation Innovation Center (DCIC).

iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS), the Maryland Institute for Technology in the Humanities (MITH), and the Computational Linguistics and Information Processing Laboratory (CLIP), as well as the Departments of Computer Science, English, and Sociology, the Robert H. Smith School of Business, and the College of Education.

The College also operates a student computer lab for currently enrolled students.

Faculty and students participate in cooperative research with staff of the University Libraries, the Human-Computer Interaction Laboratory, and other campus units. Students have access through cooperative arrangements and programs to the resources of Archives II, the National Agricultural Library, the Library of Congress, and other prominent research facilities.

Information Management, Master of Information Management (M.I.M.)

Thesis option: 36 credits

Non-thesis option: 36 credits

Successful completion of the MIM degree requires that students complete 36 credit hours of academic work with at least a B average (3.0 GPA). Full-time students complete the program in 24 months. Part-time students typically complete the program in two to three academic years. Students may take courses in daytime and evening and may switch between part-time and full-time enrollment. However, all coursework must be finished within five calendar years of the first registration.

All MIM students must complete four core courses, which provide a foundation of skills and knowledge related to information, technology, user analysis, and management. These courses must be completed within student's first 18 credits in the program. The MIM core courses include INFM600, INFM603, INFM605, and INFM612.

After completing the MIM core courses, all students are required to complete a set of electives that provide depth of knowledge in one or more areas of information management expertise. To help students satisfy this requirement, the MIM program offers a variety of focus areas and specialization guidelines, which provide students with examples of ways their MIM elective coursework can be organized to meet their educational and professional goals. The program offers seven focus areas (cyber threat intelligence, data science and analytics, game and entertainment analytics, information risk management, smart cities and connected communities, strategic management, and technology development) and two specialization tracks(Information Analysis - with a focus on either **Data Analytics** or **Strategic Management and Technology Design** - with a focus on Technology Development).

If students are interested in developing a general course of study, there is an option for the **Individualized Program Plan**. There is also an option for writing a thesis through the **Information Management Research** track.

Course	Title	Credits
Required courses:		
INFM600	Information Environments	3
INFM603	Information Technology and Organizational Context	3
INFM605	Users and Use Context	3
INFM612	Management Concepts and Principles for Information Professionals	3
Thesis or Non-Thesis Requirements		
Select one of the following:		6
Thesis:		
INFM799	Master's Thesis Research	
Non-Thesis:		
INFM736	Information Management Experience	
INFM737	Information Management Capstone Experience	
Specialization Options		
Select one of the following:		18
Data Analytics [1]		
Strategic Management [1]		
Technology Development [1]		
Information Management Research [2]		
Individualized Program Plan [1]		
Total Credits		**36**

1. Non-thesis option only
2. Thesis option only

Information Management (online) (MIMO)

Graduate Degree Program
College: Information Studies

This program is not currently accepting applications. Please visit the department website for information on other programs.

Website: https://ischool.umd.edu/

Admissions
General Requirements

- Statement of Purpose: Though the responses to these questions may have some overlap with the Graduate School's statement of purpose – applicants may cut and paste, as relevant, from the Graduate School's statement submission
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT): GRE required for international students but can be waived for domestic students with 3.2 GPA and above.
- CV/Resume
- Supplementary Application

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.ischool.umd.edu

Requirements

- Information Management, Master of Information Management (M.I.M.) (p. 252)

Information Management, Master of Information Management (M.I.M.)

This program is not currently accepting applications.

Information Studies (INFS)

Graduate Degree Program
College: Information Studies

Abstract

The PhD program at Maryland's iSchool offers an interdisciplinary approach to research and teaching provided by faculty at this leading public research university. Small classes and wide-ranging research projects enable students to work closely with faculty mentors to gain experience in identifying knowledge gaps, investigating both theoretical and practical solutions, evaluating results, and creating and disseminating new knowledge. A range of required research courses, two foundational doctoral seminars, and electives chosen by the students and their faculty mentors provide both the structure necessary for individuals to become successful researchers and the flexibility that allows them to pursue the research areas about which they are most passionate.

What Are the Unique Aspects of the Doctoral Program?

Maryland's iSchool is at the center of groundbreaking research in the fast-moving field of information studies. With a multidisciplinary faculty studying such diverse topics as online communities, information systems, information policy, human-computer interaction, and digital cultural heritage, the iSchool cultivates doctoral students from a wide range of backgrounds. The PhD program offered at the iSchool provides students with training in interdisciplinary theory, research, and pedagogy as preparation for original research that connects communities, technologies, and information.

The iSchool's location near Washington, DC, the information capital of the world, offers unparalleled opportunities for students to pursue research and employment opportunities. Our PhD students hold internships at and conduct research in government agencies, top technology and design firms, and the nonprofit sector; and graduate to jobs in academia, industry, and government.

What are the Goals of the Doctoral Program?

Upon successful completion of the doctoral program, graduates have:

- Knowledge of the foundations of the field of information studies.
- Mastery of research methods and design.
- Understanding of the research in a specialized content area.
- Proficiency in synthesizing and applying knowledge from a variety of areas.
- Expertise in conducting research and disseminating new knowledge.

Financial Assistance

Information on the availability of financial assistance is available on the Ph.D. program's website at http://ischool.umd.edu/phd (http://ischool.umd.edu/phd/). The College seeks to offer funding to entering doctoral students throughout their study in the doctoral program, contingent on factors such as successful progress through the doctoral program, likelihood of timely completion of the doctoral program, qualifications, and the availability of funding.

Contact

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University of Maryland
College Park, MD 20742
Telephone: 301.405.2038
Fax: 301.314.9145
Email: ischooladmission@umd.edu

Dr. Eun Kyoung Choe
Director of Ph.D. in Information Studies Program
4105 Hornbake Building South Wing
4130 Campus Drive
University of Maryland
College Park, MD 20742
Email: ischooladmission@umd.edu

Website: https://ischool.umd.edu/

Courses: INFM (https://umd-curr.courseleaf.com/graduate/courses/infm/) INST (https://umd-curr.courseleaf.com/graduate/courses/inst/) LBSC (https://umd-curr.courseleaf.com/graduate/courses/lbsc/)

Relationships: Curation and Management of Digital Assets (online) (Z093) (p. 152) History and Library & Information Science (HILS) (p. 241) Human-Computer Interaction (HCIM) (p. 243) Information Management (INFM) (p. 249) Library and Information Science (LBSC) (p. 271) Library and Information Science (online) (LBSO) (p. 273) School Librarianship (Z114) (p. 362) Youth Experience (Z113) (p. 415)

Admissions

General Requirements

- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Management Admissions Test (GMAT) (optional)
- Graduate Record Examination (GRE) (optional)
- GRE Subject (optional)
- CV/Resume
- Writing Sample (one required, up to two more optional)
- Portfolio PDF Upload (optional)

Additional Admissions Requirements

- The **Graduate School application** form including a non-refundable application processing fee
- **One official copy of each transcript** from each academic institution attended sent directly from the institution

- Maryland **in-state tuition form**, if applicable
- **Three recommendations** sent directly by the student's references. It is preferable to request at least one letter from a former professor who is able to give an in-depth evaluation of the strengths and weaknesses of the applicant's academic work.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 10, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 10, 2021

RESOURCES AND LINKS:
Program Website: https://ischool.umd.edu/
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Information Studies, Doctor of Philosophy (Ph.D.) (p. 253)

Facilities and Special Resources

The College operates six research centers: Center for Archival Futures (CAFe), the Center for Advanced Study of Communities and Information (CASCI), the Computational Linguistics and Information Processing (CLIP), The Human-Computer Interaction Lab (HCIL), the Social Data Science Center (SoDA), and the Trace Research & Development Center (Trace). The College also facilitates three interest groups: the Sociotechnical Cybersecurity (STC) Interest Group, the Search Mastery Interest Group, and the Dean's Distinguished Lecture Series.

iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS) and the Maryland Institute for Technology in the Humanities (MITH), as well as the Departments of Computer Science, Criminal Justice, English, Geographical Sciences, and Sociology, the Robert H. Smith School of Business, the School of Public Policy, and the College of Education and the College of Journalism.

Faculty and students participate in cooperative research with staff of the University Libraries, the Human-Computer Interaction Laboratory (HCIL), and other campus units. Students have access through cooperative arrangements and programs to the resources of Archives II, the National Agricultural Library, the Library of Congress, and other prominent research facilities.

Information Studies, Doctor of Philosophy (Ph.D.)

Doctoral students must complete a minimum of 27 graduate credit hours at the University of Maryland. Course work will be taken in three areas of study:

- Information Studies (6 credit hours)
- Research Methods and Design (12 credit hours)
- Specialized area(s) (9 credit hours)

Advance to Candidacy: In addition to course requirements, students must successfully pass a first-year review, submit an integrative paper, and a dissertation proposal.

Post-Candidacy: Complete at least 12 credits of INST899 as well as successfully defend and submit an original dissertation.

Course	Title	Credits
INST800	The Engaged Intellectual: An Introduction to Research and Academic Work	3
INST810	Course INST810 Not Found	3
INST888	Doctoral Seminar	6
Select 6 additional credits of Research Methods and Design courses		6
Select nine credits in a specialized area		9
Submit an integrative paper		
Dissertation Research Requirement		
INST899	Doctoral Dissertation Research	12
Total Credits		**39**

Information Systems (BMIS)

ABSTRACT

Maryland Smith's Master of Science in Information Systems program gives you the cutting-edge data science, IT and analytical skills you'll need to stand out in the job market and help company leaders make informed decisions.

- Learn the best ways to manage data using the latest analytics tools and explore how to help business leaders further adapt to a changing technological landscape.
- Participate in case competitions and do simulation exercises that mirror the challenges you'll face in the workplace.
- Build relationships with other talented students from diverse academic backgrounds and boost your skills under the guidance of expert faculty.

Financial Assistance

Financial aid is available to qualified students in the form of fellowships, graduate assistantships, and scholarships.

Contact

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: smithmasters@umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	May 24, 2022

RESOURCES AND LINKS:
Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Information Systems, Master of Science (M.S.) (p. 254)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database. The OCS also participates in regional and national career forums and job fairs.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Information Systems, Master of Science (M.S.)

Non-thesis only: 30 credits required

The MS in Information Systems program is ideal for those who understand the value of technology and are interested in gaining the knowledge to manage it. You will learn how information is captured, organized, managed and analyzed, preparing you to lead in the ongoing technology revolution. Get ready to harness the power of information and help move your organization to the next level.

Course	Title	Credits
Required courses:		
BUDT758	Special Topics in Decision, Operations and Information Technologies (BUDT758Y - Database Management Systems)	3
BUSI788	Introduction to Global Business Experience (BUSI788B - Data Models and Decisions)	3
BUDT758	Special Topics in Decision, Operations and Information Technologies (BUDT758X - Data Processing and Analysis in Python)	3
BUSI622	Managing Digital Business Markets	2
BUSI621	Digital Transformation in Business	2
BUSI785	Project Management in Dynamic Environments	2
BUDT758	Special Topics in Decision, Operations and Information Technologies (BUDT758N - Business Process Analysis for Information Systems)	3
Approved Electives		12
Total Credits		**30**

Integrated Pest Management (Z089)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

ABSTRACT

The Graduate Certificate in Integrated Pest Management (GC-IPM) is a 12-credit graduate program that can be completed in twelve months of continuous study. The GC-IPM focuses on the techniques of integrated pest management for proper pest control management. The program is an effective and environmentally conscientious approach to pest management. Students learn about the life cycles of insects and their interaction with the environment to determine the most effective pest control methods while taking in consideration the effects of treatments to local ecosystems.

Contact

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Email: mshofner@umd.edu

Website: http://oes-entm.umd.edu (http://oes-entm.umd.edu/)

Relationships: Applied Entomology (MPAE) (p. 46) Beekeeping (Z088) (p. 69) Integrated Pest Management (Z089) (p. 254)

Organic and Sustainable Agriculture (Z090) (p. 317) Urban Agriculture (Z091) (p. 407)

Courses: ENTM (https://umd-curr.courseleaf.com/graduate/courses/entm/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (1)
- Bachelor's degree in a biological field (exceptions can be made with work experience in a biological field and strong letters of recommendation)
- GPA of 3.0 or higher (exceptions can be made with work experience in a biological field and strong letters of recommendation)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	August 19, 2022	February 18, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	August 19, 2022	February 18, 2022

RESOURCES AND LINKS:
Program Website: oes-entm.umd.edu (http://oes-entm.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Integrated Pest Management, Post-Baccalaureate Certificate (P.B.C.) (p. 255)

Integrated Pest Management, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

In this 12-credit certificate, students learn the techniques of Integrated Pest Management (IPM), an effective and environmentally conscientious approach to pest management. Students learn about the life cycles of insects and their interaction with the environment to determine the most effective pest control methods while taking in consideration the effects of treatments to local ecosystems.

Course	Title	Credits
Required courses:		
ENTM710	Insect Biodiversity, Physiology and Ecology	3
ENTM725	IPM Practices	3
ENTM735	Sustainability	3
ENTM747	Pollinator Health	3
Total Credits		**12**

Intelligence Analysis (Z021)

THIS CERTIFICATE IS NOT CURRENTLY ACCEPTING APPLICATIONS.
Graduate Certificate Program
College: Public Policy

ABSTRACT

The objective of the Certificate Program in Intelligence Analysis is to develop proficiency in a uniform set of core conceptual competencies and skills that all those involved in the support of major national security and intelligence agencies should possess, as well as additional tools important to particular forms of intelligence analysis.

At no time in American history has sound intelligence analysis been a more important public policy concern. Today, the collection, analysis, and dissemination of intelligence to support national security decision making is rightly at the forefront of government and supporting organizations' actions.

CONTACT

Michael Goodhart
School of Public Policy
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.9715
Email: goodhart@umd.edu

Website: http://www.publicpolicy.umd.edu

Courses: PLCY (https://academiccatalog.umd.edu/graduate/programs/plcy/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Not currently accepting applications	Not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	N/A	N/A

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Intelligence Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 256)

Intelligence Analysis, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course requirements are as follows:

Course	Title	Credits
PLCY724	Problems of Global Security	3
Electives approved by advisor		9
Total Credits		**12**

International Education Policy (HIEP)

Graduate Degree Program
College: Education

Abstract

The Higher Education, Student Affairs, and International Education (HESI) program is committed to advancing the positive role education can have in society. Our faculty and students study core facets of the education system; this includes the functioning and impact of colleges and universities, student learning and development in higher education, and the enactment and implementation of K-18 and nonformal education policies in an international context. HESI offerings are characterized by a particular emphasis on social justice, diversity, policy, and system change. Our students and faculty are scholars, practitioners, change agents, and innovative leaders active in universities, as well as in national and international organizations and policy-making bodies. The program is a collaborative community that develops theory, conducts research and translates these into practice, and engages students, educators, and professionals in the advancement of education.

The HESI programs offer three areas of concentration: Higher Education; Student Affairs; and International Education Policy. Please only include one area of concentration on the application. Before applying students should familiarize themselves with each concentration area and choose the one that most closely fits their own particular needs and aspirations. The College of Education website (http://www.education.umd.edu/) offers descriptions of all the concentrations, faculty profiles and contact information, and is an essential resource for all applicants.

Note that, as of 2012, the HESI graduate programs are part of a new department, the Department of Counseling, Higher Education, and Special Education. Previously, Student Affairs was part of the Department of Counseling and Personnel Services and Higher Education and International Education Policy were part of the Department of Education Leadership, Higher Education, and International Education.

The International Education Policy (IEP) (http://www.education.umd.edu/) program offers M.A. and Ph.D.degrees designed to provide an interdisciplinary understanding of today's educational policy and practice. The focus is on the relation of education to economic, political, and social development in both developing and developed countries at local, national, regional, and global levels. The IEP program gives comprehensive attention to education, considering both formal schooling, from pre-school to higher education, as well as non-formal, adult, and community-based education.

Financial Assistance

The Department has a very limited number of merit-based fellowships and graduate assistantships available to doctoral students. Fellowships are awarded to doctoral students in March only for the following fall semester. Assistantships are also awarded in the spring for the following fall semester, but occasionally an assistantship may become available at another time of year. A large number of assistantships are also available throughout campus, and many students regularly find assistantships in other departments and offices on campus. Both fellowships and assistantships are awarded on a competitive basis. It is to the student's advantage to apply well before the published application deadlines and to submit a complete application package if they intend to be considered for a fellowship, assistantship, or other form of financial aid. It is a requirement that a student be admitted as a condition of eligibility. International students' applications are not considered complete and are not reviewed by the Department until they have received clearance from the Office of International Student and Scholar Services (ISSS), which can take additional time. If you need information about ISSS clearance visit the ISSS website at www.umd.edu/ies (http://www.umd.edu/ies/). For more information on financial assistance, see the department website: www.education.umd.edu/chse/admissions/finance (http://www.education.umd.edu/chse/admissions/finance/).

Contact

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Graduate Assistant for International Education Policy
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Telephone: 301.405.2858
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Carol Scott
Coordinator of Graduate Studies
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University of Maryland
College Park, MD 20742
Telephone: 301.405.8384
Fax: 301.405.9995
Email: cscott18@umd.edu (chse-admissions@umd.edu)

Website: https://education.umd.edu/academics/departments/chse/hesi/international-education-policy **(**https://education.umd.edu/academics/departments/chse/hesi/international-education-policy/**)**

Courses: EDCI **(**https://umd-curr.courseleaf.com/graduate/courses/edci/**)** EDCP **(**https://umd-curr.courseleaf.com/graduate/courses/edcp/**)** EDHI **(**https://umd-curr.courseleaf.com/graduate/courses/edhi/**)**

Relationships: Higher Education (HIED) **(**p. 231**)** Student Affairs (HISA) **(**p. 383**)**

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) or Miller Analogies Test (MAT) {optional for fall 2021 admission)
- CV/Resume
- Writing Sample
- Description of Research/Work Experience
- Publications/Presentations
- Minimum Graduate GPA of 3.5 for Ph.D. applicants (some exceptions are made)

Please see the "How to Apply" (https://education.umd.edu/admissions/graduate/phd-higher-education/) section for details and deadlines.

Grade Point Average (GPA)

A minimum undergraduate grade point average of 3.0 is required. A minimum graduate grade point average of 3.5 is required for doctoral programs.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 10, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 10, 2021

RESOURCES AND LINKS:
Program Website: http://www.education.umd.edu/CHSE/admissions/admission_criteria/
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- International Education Policy, Doctor of Philosophy (Ph.D.) (p. 258)
- International Education Policy, Master of Arts (M.A.) (p. 257)

Facilities and Special Resources

Faculty and students in the Department work closely with area schools, colleges, universities, associations and other education-related organizations. Extensive resources in the Washington, D.C., area, including international agencies and non-governmental organizations, provide exceptional opportunities for internships, field experiences, and research to enhance formal course experiences.

International Education Policy, Master of Arts (M.A.)

Thesis option: 30 credits
Non-Thesis option: 30 credits

The M.A. program in International Education Policy is looking for first-rate students with an interest in professional careers or further study in the field. This degree seeks to form professionals with an understanding of the complex array of issues concerning educational policies and practices in both developing and industrialized countries. It also seeks to form professionals who will join institutions working on projects that range from assistance to educational systems under times of crisis to efforts to improve educational curricula and to the conduct of exchanges of students and academics across countries.

The M.A. program requires a minimum of 30 credits and usually takes one and a half to two years to complete. The program is distinguished by the development of a unique program of study to suit the needs of each student.

Course	Title	Credits
EDHI672	Modes of Inquiry in Education Research	3
Quantitative or Qualitative Methods course		3
Select two of the following:		6
EDHI605	Comparative Education	
EDHI606	Political Economy of Education in a Global Context	
EDHI607	Culture and Education in a Global Context	
Thesis or Non-Thesis Requirements		
Select one of the following:		18
Thesis:		
EDHI799	Master's Thesis Research	
Select one additional research methods course		
International Education Electives and Disciplinary Professional courses		
Non-Thesis:		

EDHI679	Master's Seminar	
International Education Electives and Disciplinary Professional courses		
Complete a Master's paper		
Total Credits		**30**

International Education Policy, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 90 credits beyond the Bachelor's degree, including a maximum of 24 credits transferred from a previously earned Master's degree. Students are also required to complete 12 credits of EDHI899, which is included in the total credit requirement.

The degree generally requires 54 credits of coursework which can be completed in 2 to 3 years. The program is distinguished by the development of a unique program of study to suit the needs of each student. Initial program plans are flexible and are usually revised throughout a student's graduate work as particular directions and their implications for coursework develop.

Advance to Candidacy: In addition to course requirements, students must successfully pass a comprehensive exam in order to advance to candidacy.

Post-Candidacy: Complete at least 12 credits of EDHI899 doctoral dissertation research as well as successfully defend and submit an original dissertation.

Course	Title	Credits
A maximum of 24 credits transferred from a previously earned Master's degree.		24
EDHI605	Comparative Education	3
EDHI606	Political Economy of Education in a Global Context	3
EDHI607	Culture and Education in a Global Context	3
Research Methods courses:		
EDHI672	Modes of Inquiry in Education Research	3
Quantitative Methods course		3
Qualitative Methods course		3
Two courses in Methodological Approaches		6
International Education Electives and Disciplinary Professional courses		30
Dissertation Research Requirements		
EDHI899	Doctoral Dissertation Research	12
Total Credits		**90**

Interpreting (MPIN)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Master of Professional Studies in Interpreting (MPS in Interpreting) is designed to equip students with the required competencies to compete successfully for work as conference interpreters or community interpreters. Example skills include specialized work in both the consecutive and simultaneous modes in health, legal and political settings, for major corporations, international organizations, government ministries, and international, federal, and state courts requiring simultaneous capability.

The MPS in Interpreting is a two-year, 44 credit program. In the first year, you begin to develop high-level skills in consecutive interpretation (oral rendering after the speaker pauses). In the program's second year, you build on these fundamental skills and may learn simultaneous interpreting, while specializing in conference interpreting, or public service interpreting. Simultaneous interpreting may be selected as an elective in the public service interpreting track.

Contact

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Telephone: 301.314.1205
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Website: http://www.gsit.umd.edu

Relationships: Consecutive Interpreting (Z080) (p. 139) Translation (Z079) (p. 405) Translation (MPTR) (p. 404)

Courses: COMM (https://umd-curr.courseleaf.com/graduate/courses/comm/)

Admissions

This program is not currently accepting applications

Requirements

- Interpreting, Master of Professional Studies (M.P.S.) (p. 258)

Interpreting, Master of Professional Studies (M.P.S.)

44 credits required

Students select either the Conference Interpreting track or the Public Service Interpreting track. In either track, students can focus on two languages or three.

Regardless of track or number of languages, all MPIN students must complete the following courses:

Course	Title	Credits
COMM610	Introduction to Translation and Interpreting Studies	3
COMM683	Intercultural Communication Theory	3
COMM769	Professional Practice Forum in Interpreting: Workplace Processes and Procedures	1
COMM789	Seminar: Special Topics in Intercultural Communication	3
COMM657	Professional Practice Forum in Interpreting: Career Portfolio and Exams	1
COMM759	Professional Practice Forum in Interpreting: Practicum	1
Additional course requirements [1]		32
Total Credits		**44**

[1] Students should check the department website for the remainder of their course requirements. The remainder of the course requirements vary based on the student's track and number of languages.

Jewish Studies (JWST)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Jewish Studies Program offers both a Masters Degree in Jewish Studies, and a Graduate Certificate in Jewish Studies.

The Masters Program in Jewish Studies is designed to offer students broad, interdisciplinary, graduate-level training in Jewish Studies, as well as in-depth focus on some aspect of the Jewish experience. The curriculum draws on the strengths of the Jewish Studies Program at Maryland, especially Jewish History, Bible, Jewish Literature and Cultural Studies (particularly in the ancient and modern periods), Yiddish, Philosophy, Religious Studies, and Israel Studies. In addition, students take courses in cognate fields outside of Jewish Studies in consultation with their advisors. The extremely strong, and still growing, library collection (rivaled in the mid-Atlantic region only by the Library of Congress), and our proximity to the National Archives, the Library of Congress, the U.S. Holocaust Memorial Museum, and other museums and institutions make the University a prime location for graduate Jewish Studies.

The Post Baccalaureate Certificate in Jewish Studies offers students already enrolled in graduate programs at the University to receive training in Jewish Studies. The program draws on faculty in History, English, Philosophy, Hebrew, and other departments and programs.

Financial Assistance

MA applicants are eligible for University-wide fellowships. In addition, the Jewish Studies program may award up to two fellowships per year to outstanding Masters students.

Limited funds may be available for outstanding certificate students.

For more information, please contact the Prof. Charles Manekin, Director of the Meyerhoff Center and Program for Jewish Studies.

Contact

The Joseph and Rebecca Meyerhoff Program and Center for Jewish Studies
4141 Susquehanna Hall
4200 Lehigh Road
College Park, MD 20742
Telephone: 301.405.4975
Fax: 301.405.8232
Email: jwst-contact@umd.edu

Website: http://www.jewishstudies.umd.edu

Courses: JWST **(**https://umd-curr.courseleaf.com/graduate/courses/jwst/**)**

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations
- Writing Sample

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	17 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	31 Jan

Other Deadlines: Please visit the program website at http://www.jewishstudies.umd.edu

Requirements

- Jewish Studies, Master of Arts (M.A.) (p. 260)

Facilities and Special Resources

The University's libraries hold over 3,000,000 volumes and house among the strongest holdings in Judaic Studies in the Mid-Atlantic region. In addition to the outstanding holdings of the Library of Congress, the area also offers the specialized resources of the Dumbarton Oaks, the National Archives, the Smithsonian Institution, the U.S. Holocaust Memorial Museum, and numerous other scholarly, cultural, and political resources. Through the Consortium of Institutions in the Washington D.C. area, University of Maryland graduate students may enroll in courses at other universities for graduate credit.

Jewish Studies, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

As a prerequisite for admission, students must have achieved the proficiency-level corresponding to four semesters of university-level Hebrew, and must achieve the level of six semesters of university-level Hebrew by the time they have completed the program. Courses in Hebrew language will not count toward the 30 credits needed for the degree. Students will be asked to demonstrate their knowledge of modern academic Hebrew by examination, or through a research project making extensive use of Hebrew-language materials.

Course	Title	Credits
JWST600	General Seminar in Jewish Studies	3
Two specialization courses		6
One course in each of the following areas: Jewish History, Jewish Thought or Religion, Jewish Literature		9
Thesis or Non-Thesis Requirements		
Select one of the following:		12
Thesis:		
Two courses in Jewish Studies in the student's specialization, approved by advisor		
JWST799	Masters Thesis Research	
Non-Thesis:		
Four courses in Jewish Studies in the student's specialization, approved by advisor		
Submit a dossier of 2 major research papers to be evaluated by an examining committee		
Total Credits		**30**

Jewish Studies (Z018)

Graduate Certificate Program
College: Arts and Humanities

abstract

The Meyerhoff Center for Jewish Studies is one of the leading centers for Jewish Studies in the United States, boasting an internationally recognized faculty, an excellent and growing Jewish Studies library collection, and especially rich library, archive, and museum resources in the greater Washington area. If you are considering graduate work in Jewish Studies the following information may be useful to you.

The Jewish Studies Program offers a Graduate Certificate and a Masters Degree in Jewish Studies. In addition, Jewish Studies offers special degrees for teachers. The Hebrew Language Program is designed for prospective or current teachers of Hebrew. Students have the option of receiving a MEd in Education (Curriculum and Instruction), or an MA in Jewish Studies. In addition, students continue to have the ability to earn a MEd in Education Policy and Leadership with a Jewish Studies concentration through the College of Education.

contact

The Joseph and Rebecca Meyerhoff Program and Center for Jewish Studies
4141 Susquehanna Hall
4200 Lehigh Road
College Park, MD 20742
Telephone: 301.405.4975
Fax: 301.405.8232
Email: jwst-contact@umd.edu

Website: http://www.jewishstudies.umd.edu

Courses: JWST **(**https://umd-curr.courseleaf.com/graduate/courses/jwst/**)**

Admissions

In order to be eligible for the Jewish Studies Certificate Program a student must be accepted into or currently enrolled in a master's or doctoral degree program at the University of Maryland. Please contact the Jewish Studies Department for more information.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the department website
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the department website

Other Deadlines: Please visit the program website at http://www.jewishstudies.umd.edu

Requirements

- Jewish Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 260)

Jewish Studies, Post-Baccalaureate Certificate (P.B.C.)

Total Credits: 12 credits required

Students must take four graduate level courses (12 credits) in Jewish Studies. At least six of the 12 credits must be in a different discipline than the student's home department. All students take JWST600 plus at least two other graduate readings or research courses at the 600-800 level. Only one 400-level course can count toward the certificate. Students must work with an advisor to determine which courses best suit their particular need

Course	Title	Credits
JWST600	General Seminar in Jewish Studies	3
Courses in Jewish Studies		9
Total Credits		**12**

Journalism (JOMJ)

Graduate Degree Program
College: Journalism

abstract

This Master of Journalism (JOMJ) degree is for students with little or no journalism experience who are looking to become professional journalists or media professionals. If you are an experienced journalist looking for a research-focused master's degree, go to Journalism (JOUR) (p. 263); if you're looking for a Ph.D. program, go to Journalism (JOST) (p. 262). If you're seeking a graduate journalism multimedia certificate, go to Multimedia Journalism (Z071) (p. 300).

The JOMJ degree is a non-thesis program that requires up to 36 credits, beginning in the fall semester. JOMJ students' degree program culminates in a review of their journalism portfolio by a panel of faculty and professionals. Broadcast or multi-platform students may further specialize in investigative, computational/data or sports focuses and may also steer their degree into other types of journalism through course selection.

The University of Maryland's journalism school offers all the resources of a top-ranked public research institution located minutes away from Washington, D.C., Annapolis and Baltimore. Its unmatched access to internships in one of the nation's top media markets and opportunities to learn from the pros working in today's multimedia newsrooms make the Philip Merrill College of Journalism a training ground like no other. Our students are fearless and #MerrillMade.

contact

Serap Rada, Ph.D.
Philip Merrill College of Journalism
Knight Hall
7765 Alumni Dr.
College Park, MD 20742
Telephone: 301.405.2513
Email: sdrada@umd.edu

Website: http://www.merrill.umd.edu

Courses: JOUR **(**https://umd-curr.courseleaf.com/graduate/courses/jour/**)**

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume
- Portfolio (Multimedia Requirements section) (optional)
- 3 Writing Samples: Writing samples uploaded to the Upload Requirements section of the application – under Writing Sample, Supplementary Application One, and Supplementary Application Two.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Early Decision: 19 Dec / Final: 5 Feb
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Early Decision: 19 Dec / Final: 5 Feb

Other Deadlines: Please visit the program website at http://www.merrill.umd.edu

Requirements

- Journalism, Master of Journalism (M.J.) (p. 261)

Facilities and Special Resources

The University of Maryland is located just a few miles from Washington, the media capital of the world. Students and researchers have access to The Washington Post and USA Today, as well as hundreds of Washington bureaus for newspapers, online news sites, and TV and radio news outlets from around the world. The Philip Merrill College of Journalism operates daily news bureaus in Washington, D.C., at the Ronald Reagan Building a few blocks from the White House; in Annapolis, just a block from the Maryland State House; and on campus from two locations -- Knight Hall, our state-of-the-art building with multiple news labs and opportunities for multi-platform experimentation; and UMTV, a cable TV station that reaches more than 600,000 homes in central Maryland. The broadcast program is equipped with state-of-the-art digital editing systems used by students to produce a 30-minute nightly newscast. Opened in 2010, Knight Hall also brings all of the College's affiliated centers under one roof. The college also provides equipment for all specialty media classes -- from broadcast cameras to DSLRs -- so students are not required to bring their own equipment.

Journalism, Master of Journalism (M.J.)

Non-thesis only: 36 credits

The degree is a 36-credit program. The M.J. is a non-thesis degree and is the preferred program of those looking to enter the journalism profession. Students admitted to the M.J. program in multi-platform or broadcast journalism are not required to possess prior training or experience in the field. Students who enter the M.J. program with significant professional

newsroom experience can request to opt out of the two required 500-level courses. The program's capstone experience is the Capital News Service, where students serve as full-time reporters in news bureaus in Washington and Annapolis, at the college's TV station, UMTV, and from our state-of-the-art news facilities in Knight Hall. For more information on our programs, visit: http://merrill.umd.edu/academics/masters-programs/

Detailed information on the requirements of our programs can be found in the master's program handbook, available online at the bottom of: http://merrill.umd.edu/academics/masters-programs/

Course	Title	Credits
Required courses:		
JOUR501	Fundamentals of Writing and Editing	3
JOUR504	Introduction to Multimedia Skills	3
JOUR702	Journalism Law and Ethics	3
Intermediate Reporting course		3
Critical Thinking course		3
Journalism Elective		3
Specialization Requirements		
Select one of the following:		18
Multiplatform Journalism		
Broadcast Journalism		
Total Credits		**36**

Specialization Options
Multiplatform Journalism

Course	Title	Credits
JOUR620	Public Affairs Reporting	3
JOUR625	Advanced Capital News Service Bureau	6
or JOUR655	Advanced Online News Bureau	
JOUR652	Interactive Design and Development	3
JOUR772	Data Journalism	3
JOUR603	News Videography	3
Total Credits		**18**

Broadcast Journalism

Course	Title	Credits
JOUR603	News Videography	3
JOUR660	Broadcast News Writing	3
JOUR661	Television Reporting and Production	3
JOUR667	Broadcast News Bureau	6
JOUR620	Public Affairs Reporting	3
or JOUR772	Data Journalism	
Total Credits		**18**

Journalism Studies (JOST)

Graduate Degree Program
College: Journalism

abstract

Maryland's elite Ph.D. in Journalism Studies (http://merrill.umd.edu/academics/phd-program/) prepares scholars for next-generation research in the key issues confronting journalism in the 21st century.

- The program features small classes and a high level of collaboration with professors (http://merrill.umd.edu/academics/phd-program/ph-d-faculty/). Work focuses on the analysis of journalism practice and ethics, media history, gender and media, international media, as well as in emerging technology and the audience.
- With an emphasis on helping journalists translate career experience into research expertise, the program is highly successful (http://merrill.umd.edu/academics/phd-program/ph-d-positions/) at placing its doctoral graduates into teaching and research posts in higher education.

If you are seeking a master's degree to provide you with the fundamentals of journalism for a professional career, please see the Journalism (JOMJ) (p. 261) degree. If you are an experienced journalist looking for a research-focused master's degree, go to Journalism (JOUR) (p. 263); If you're seeking a graduate journalism multimedia certificate, go to Multimedia Journalism (Z071) (p. 300).

Contact

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Director of Ph.D. Program in Journalism Studies
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University of Maryland
College Park, MD 20742
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Website: http://www.merrill.umd.edu

Courses: JOUR (https://umd-curr.courseleaf.com/graduate/courses/jour/)

Admissions
GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample (academic work; optional)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	29 Jan
International Applicants	

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	29 Jan

Other Deadlines: Please visit the program website at http://www.merrill.umd.edu

Requirements

- Journalism Studies, Doctor of Philosophy (Ph.D.) (p. 263)

Journalism Studies, Doctor of Philosophy (Ph.D.)

The University of Maryland's Ph.D. in Journalism Studies is designed to prepare students for careers in university teaching, academic and industry research, and media consulting. The first two years of the program consist of coursework in theory, research methods, journalism, and an outside area of interest (such as Communications, Sociology, History, etc.). After advancing to doctoral candidacy, students then conduct research and write the dissertation. Most successful candidates enter the program with a master's degree, but a master's degree is not a prerequisite for admission

Advance to Candidacy: At the end of coursework, students are required to pass five comprehensive examinations: four written comprehensive exams and one oral exam. Each of the four written exams cover the following topics: theory, a cognate area, methodology, and an area of specialization. The fifth one is an oral defense of the comprehensive exams.

Post-Candidacy: Complete at least 12 credits of JOUR899 doctoral dissertation research. Successfully defend and submit an original dissertation.

Course	Title	Credits
Core Requirements		
JOUR775	Quantitative Methods in Journalism and Public Communication Research	3
JOUR776	Qualitative Research Methods in Journalism and Public Communication	3
JOUR601	Theories of Journalism and Public Communication	3
JOUR610	Seminar in Mass Media History	3
JOUR800	Introduction to Doctoral Study in Journalism and Public Communication	3
JOUR801	Advanced Public Communication Theory	3
Select a minimum of nine credits in cognate courses outside of Journalism [3]		9
Electives		6
Additional Research Design and Methods course		3
Dissertation Research Requirements		
JOUR899	Doctoral Dissertation Research in Journalism and Mass Communication	12
Total Credits		**48**

Journalism (JOUR)

Graduate Degree Program
College: Journalism

Abstract

This Master of Arts (JOUR) degree is mainly intended for experienced journalists seeking a research-focused, academic journalism degree with the goal of a future teaching or Ph.D. program. If you are seeking a master's degree to provide you with the fundamentals of journalism for a professional career, please see the Journalism (JOMJ) (p. 261) degree. If you're looking for a Ph.D. program, go to Journalism (JOST) (p. 262). If you're seeking a graduate journalism multimedia certificate, go to Multimedia Journalism (Z071) (p. 300).

The Master of Arts in Journalism is a research-oriented, thesis program of 30 credits. The program is intended for experienced journalists, academics and others who are looking for a more scholarly master's program. The degree offers a great deal of flexibility by tapping into the resources of the University of Maryland, a top-ranked, public, research institution located minutes away from Washington, D.C., Annapolis and Baltimore. The college's unmatched access to internships in one of the nation's top media markets and opportunities to learn from the pros working in today's multimedia newsrooms make the Philip Merrill College of Journalism a training ground like no other. Our students are fearless and #MerrillMade.

Contact

Serap Rada, Ph.D.
Philip Merrill College of Journalism
Knight Hall
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University of Maryland
College Park, MD 20742
Telephone: 301.405.2513
Fax: 301.314.9166
Email: sdrada@umd.edu

Website: http://www.merrill.umd.edu

Courses: JOUR **(**https://umd-curr.courseleaf.com/graduate/courses/jour/**)**

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume
- Portfolio (Multimedia Requirements section) (optional)
- 3 Writing Samples: Writing samples uploaded to the Upload Requirements section of the application – under Writing Sample, Supplementary Application One, and Supplementary Application Two.

Applicants seeking admission to the master's program must hold a bachelor's degree from a accredited institution of higher learning. Undergraduate study of journalism and/or professional experience in journalistic fields are not required. Students must take the Graduate

Record Examination (GRE), provide three writing samples and obtain three letters of recommendation.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Early Decision: 19 Dec / Final: 5 Feb
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Early Decision: 19 Dec / Final: 5 Feb

Other Deadlines: Please visit the program website at http://www.merrill.umd.edu

Requirements

- Journalism, Master of Arts (M.A.) (p. 264)

Facilities and Special Resources

The University of Maryland is located just a few miles from Washington, the media capital of the world. Students and researchers have access to The Washington Post and USA Today, as well as hundreds of Washington bureaus for newspapers, online news sites, and TV and radio news outlets from around the world. The Philip Merrill College of Journalism operates daily news bureaus in Washington, D.C., at the Ronald Reagan Building a few blocks from the White House; in Annapolis, just a block from the Maryland State House; and on campus from two locations -- Knight Hall, our state-of-the-art building with multiple news labs and opportunities for multi-platform experimentation; and UMTV, a cable TV station that reaches more than 600,000 homes in central Maryland. The broadcast program is equipped with state-of-the-art digital editing systems used by students to produce a 30-minute nightly newscast. Opened in 2010, Knight Hall also brings all of the College's affiliated centers under one roof. The college also provides equipment for all specialty media classes -- from broadcast cameras to DSLRs -- so students are not required to bring their own equipment.

Journalism, Master of Arts (M.A.)

Thesis only: 30 credits

The degree requires 30 credits of coursework and a thesis, which is a critical and scholarly work. Required among the 30 credits are three-credits of research methods, three credits of theory and six credits of master's thesis work. The remaining 18 credits are comprised of elective courses, which may be taken within the College of Journalism or, with approval, in affiliated fields of study within the Graduate School or Washington Consortium.

Course	Title	Credits
Theory course		3
Research Methods course		3
Electives chosen with advisor		18
JOUR799	Master's Thesis Research	6
Total Credits		**30**

Justice Leadership (MPJL)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The degree is jointly offered by the Department of Criminology and Criminal Justice and the School of Public Policy and is managed by the Office of International and Executive Programs (OIEP).

Contact

Office of International and Executive Programs
1117L Chincoteague Hall
7401 Preinkert Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3356
Fax: 301.405.7481
Email: OIEP@umd.edu

Website: https://ccjs.umd.edu/landingtopic/masters-program (https://ccjs.umd.edu/landingtopic/masters-program/); https://oiep.umd.edu/landingtopic/joint-program-peoples-police-academy (https://oiep.umd.edu/landingtopic/joint-program-peoples-police-academy/)

Relationships: Criminology and Criminal Justice (CJCH) (p. 147) Criminology and Criminal Justice (CRIM) (p. 148)

Courses: CCJS (https://umd-curr.courseleaf.com/graduate/courses/ccjs/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)
- Notarized degree certificate
- Transcripts in English and Vietnamese

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Not currently accepting applications
International Applicants	

F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Not currently accepting applications

Other Deadlines: Please visit the program website at https://ccjs.umd.edu/landingtopic/masters-program (https://ccjs.umd.edu/landingtopic/masters-program/)

Requirements

- Justice Leadership, Master of Professional Studies (M.P.S.) (p. 265)

Justice Leadership, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits required

Course	Title	Credits
University of Maryland courses:		
CCJS600	Criminal Justice	3
CCJS601	Policing	3
CCJS604	Policy Analysis Project	3
CCJS680	Drugs and Crime	3
PUAF/PLCY692	Course PUAF692 Not Found	3
PUAF/PLCY699	Course PUAF699 Not Found	3
PUAF/PLCY711	Course PUAF711 Not Found	3
Vietnam People's Police Academy courses:		
BSOS678	Special Topics in Justice Leadership (BSOS678A)	3
BSOS678	Special Topics in Justice Leadership (BSOS678B)	3
BSOS678	Special Topics in Justice Leadership (BSOS678C)	3
Total Credits		**30**

Kinesiology (KNES)

Graduate Degree Program
College: Public Health

Abstract

A vital part of the School of Public Health, the Department of Kinesiology offers programs leading to the Master of Arts (thesis and non-thesis options) and Doctor of Philosophy degrees. Research emphases within the three broadly defined areas of exercise physiology, cognitive motor neuroscience, and physical cultural studies are offered. Within each of these cognate areas, students develop specialized programs with faculty guidance and consistent with faculty expertise. Details of faculty research interests and additional information can be found at the department website http://www.sph.umd.edu/KNES/

Financial Assistance

Teaching and research graduate assistantships are offered each academic year. At the present time, over two-thirds of the graduate students are financially supported. Teaching assistants work as discussion leaders and laboratory assistants as well as instructors in physical activity classes. Many research assistants are supported by grants. The department is active in seeking University fellowships for its outstanding applicants. Currently the department provides partial financial support for all graduate students who are selected to present their research at scholarly meetings.

Contact

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Website: http://www.sph.umd.edu/knes (http://www.sph.umd.edu/knes/)

Courses: KNES (https://umd-curr.courseleaf.com/graduate/courses/knes/) SPHL (https://umd-curr.courseleaf.com/graduate/courses/sphl/)

Relationships: Bioengineering (BIOE) (p. 76) Neurosciences and Cognitive Science (NACS) (p. 312)

Admissions

The M.A. and Ph.D. in Kinesiology accepts application through the online graduate application (https://terpengage.force.com/community/CustomLoginPage/?GradApp=True) through the TerpEngage Graduate Admissions System.

General Requirements

- A Bachelor's degree
- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Minimum 3.0 undergraduate GPA (M.A. applicants)
- A Kinesiology undergraduate degree is not required; relevance of undergraduate major at discretion of proposed faculty advisor (M.A applicants)
- Master's degree in Kinesiology is not required; prior degree relevance will be assessed by the potential faculty advisor (PhD applicants)
- Three letters of recommendation - letters should be from people knowledgeable about the applicant's prior academic achievements and potential
- CV/Resume
- Official GRE test scores submission is waived for Fall 2022 admissions. GRE scores won't be reviewed.
- A writing sample(s) is required, such as an Undergraduate thesis or major paper; Master's thesis or major paper; Published manuscript (if you submit a published manuscript and you are not the first author, describe your contribution to the publication).
- Description of Research/Work Experience (optional)
- Publications/Presentations (optional)
- Teaching Assistantship form (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationknes.pdf) (optional)

Students may qualify for admission with a 3.0 GPA for M.A. or 3.5 GPA for Ph.D. programs, and a focused letter detailing academic and research goals as well as previous research experiences. In addition, each applicant should submit a minimum of three strong recommendations from people knowledgeable about the applicant's prior academic achievements and research potential. Appropriate background course work closely aligned with the intended research specialization is expected. Graduate faculty sponsorship is also necessary for admission; each faculty member has only a limited number of openings and only the most highly qualified applicants are selected. Faculty review of applications does not occur until all required parts of the application are received. This review is done in early January; therefore applicants are encouraged to have all their application materials submitted by January 1 for best consideration for admission and financial support.

Note: Regardless of academic preparation, a qualified faculty member in the proposed Area of Study (i.e. Cognitive Motor Neuroscience, Exercise Physiology, or Physical Cultural Studies) must be willing to sponsor and mentor the student prior to applying. Applicants should speak with the faculty member with whom they prefer to study. Applicants are encouraged to visit the campus and make appointments to interview with faculty.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	3 Dec	3 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	3 Dec	3 Sep

RESOURCES AND LINKS

Program Website: sph.umd.edu/department/knes/kinesiology-graduate-program (http://sph.umd.edu/department/knes/kinesiology-graduate-program/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)
KNES Faculty: https://sph.umd.edu/academics/departments-units/department-kinesiology/people-kinesiology (https://sph.umd.edu/academics/departments-units/department-kinesiology/people-kinesiology/)

Requirements

- Kinesiology, Doctor of Philosophy (Ph.D.) (p. 267)
- Kinesiology, Master of Arts (M.A.) (p. 267)

Facilities and Special Resources

The Department has three areas of specialization: Cognitive Motor Neuroscience, Exercise Physiology, and Physical Cultural Studies. Laboratories are maintained, which support original investigations in each of the three areas. Laboratories include equipment for measuring metabolic parameters, strength, body composition, postural sway, ground reaction forces, amount of physical activity in daily life, as well as muscle biopsies and movement analysis. The response of the human body to physical activity/exercise can be viewed through ECG, EEG, EMG and systematic behavior observation systems. Each of the three research areas has interfaced computer hardware and software to support data collection and analysis. Collaborations with the School of Medicine at the Baltimore campus and with NIH often result in the availability of other facilities and equipment. All graduate students have access to computers and other forms of technology. Details and pictures of current facilities and equipment are available at our website: www.sph.umd.edu/KNES/. (http://www.sph.umd.edu/KNES/.html)

Cognitive Motor Neuroscience Lab Various tools provide students with opportunities to measure, postural sway, ground reaction forces, multi-digit pressing and moments in 3-D, and movement analysis. These tools include:

1. A three wall rear-projected monoscopic CAVE display system with three XGA digital projectors. The system is designed for standing humans to be immersed in a visual world to test questions about how the nervous system processes visual information to maintain upright stance.
2. A hydraulically-controlled moveable force platform for recording center of pressure and ground reaction forces inside the CAVE.
3. An Optotrak motion analysis system, capable of tracking up to 24 LEDs simultaneously for whole body analysis.
4. A touch plate consisting of a miniature force plate capable of resolving .01 N of force in three directions.
5. A Logitech 6D ultrasonic tracking system consisting of a control unit, two triangular receivers and one triangular transmitter. Each receiver provides three components of translation (x, y, z) and three components of rotation (yaw, pitch, roll) with a resolution of .006 cm.
6. A 16 channel EMG Neuraxon system for recording muscle activity. Because responses of the human body can be viewed through Electrocardiographic (ECG), Electroencephalic (EEG), and Electromyographic (EMG), we collaborate with the University of Maryland, School of Medicine at Baltimore and the National Institutes of Health. This results in the availability of other facilities and equipment whereby students may join forces on projects involving neuroimaging and virtual reality environments.

Exercise Physiology Lab The Exercise Physiology group has various laboratories capable of supporting a wide-range of exercise-related studies, including metabolic testing, Bod-Pod body composition, muscular strength and power testing, and various clinical blood-based assays. Moreover, the group collaborates with various nearby facilities for high-quality measurement of body composition, including muscle size, bone density, and visceral adiposity. A 6,000 sq. ft. training facility is fully equipped with aerobic exercise training equipment and 20+ Keiser strength training machines for all major muscle groups. In addition to these general facilities, the group maintains other specialized laboratories. The Functional Genomics Lab studies the role of genetic variation in disease susceptibility and the responses and adaptations of different individuals to various exercise programs. The lab has state of the art equipment for genetic analysis, including extensive computer resources. The Molecular Biology Lab has extensive scientific resources for examining the effects of exercise and inactivity on muscle, adipose, and other cell types utilizing both in vivo and in vitro approaches. website: www.sph.umd.edu/KNES/ (http://www.sph.umd.edu/KNES/).

Physical Cultural Studies (PCS) advances the critically and theoretically-driven analysis of physical culture, in all its myriad forms. These include sport, exercise, health, dance, and movement related practices, which PCS research locates and analyzes within the broader social, political, economic, and technological contexts in which they are situated. More specifically, PCS is dedicated to the contextually based understanding of the corporeal practices, discourses, and subjectivities through which active bodies become organized, represented, and experienced in relation to the operations of social power. PCS thus identifies the role played by physical culture in reproducing, and sometimes challenging, particular class, ethnic, gender, ability, generational, national, racial, and/or sexual norms and differences.

Kinesiology, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

Completion of the master's degree with thesis requires a minimum of 24 semester hours and six thesis credits. The M.A. non-thesis option requires a minimum of 27 semester hours, a three-credit project based on an independent scholarly investigation, and a final comprehensive examination. Students in both options work under the direction of a graduate faculty advisor and must complete, as a minimum, six semester hours in a cognate area, six semester hours in research processes, and twelve semester hours in supporting courses either in or outside of the department. If internships are selected as part of the individual program, the total credits will exceed the minimum 30 credits.

Course	Title	Credits
Required courses:		
SPHL600	Foundations of Public Health	3
KNES610	Methods and Techniques of Research	3
SPHL612	Research Ethics	1
Research tools/processes course		3
Elective		5
Specialization Requirements		
Specialization courses		6
Outside Specialization courses		3
Thesis or Non-thesis		
Thesis option:		6
MIEH799	Master's Thesis Research	
Non-thesis option:		
KNES789	Advanced Projects in Kinesiology	
Elective		
Total Credits		**30**

Kinesiology, Doctor of Philosophy (Ph.D.)

The doctoral program is designed to prepare outstanding scholars in a research domain in Kinesiology. To complete the program, a student must provide substantial evidence of his or her ability to frame and complete original research. The doctoral program in Kinesiology requires a minimum of 60 credits.

The program of study includes research experiences, as well as courses in the cognate area, other supportive courses outside of the department that broaden or deepen one's knowledge, and courses in research and analytic processes. Students also are expected to engage in the culture of Kinesiology through active participation in seminars and other departmental activities and to develop teaching expertise in the subdiscipline.

Advance to Candidacy: In addition to course requirements, students must successfully pass a comprehensive exam in order to advance to candidacy.

Post-Candidacy: Complete at least 12 credits of KNES899 doctoral dissertation research as well as defend and submit an original dissertation.The dissertation is the culminating research experience and contributes to knowledge in kinesiology.

Course	Title	Credits
Required coursework includes:		
KNES609	Research Issues in Kinesiology	1-3
or KNES618	Current Readings in Exercise and Applied Physiology	
SPHL612	Research Ethics	1
SPHL600	Foundations of Public Health	3
Teaching requirement (course chosen with advisor)		3
Research Skills and Methods Course		3
Remainder of coursework		48
Dissertation Research Requirements		
KNES899	Doctoral Dissertation Research	12
Total Credits		**71-73**

Landscape Architecture and Community Planning (LACP)

Graduate Degree Program
College: Agriculture and Natural Resources / Architecture

Financial Assistance

Please visit the program website at http://www.larch.umd.edu or http://www.arch.umd.edu.

CONTACT

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Website: http://www.larch.umd.edu **or** http://www.arch.umd.edu

Courses: LARC **(**https://umd-curr.courseleaf.com/graduate/courses/larc/**)** ARCH **(**https://umd-curr.courseleaf.com/graduate/courses/arch/**)**

Admissions

General Requirements

- Statement of Purpose: In addition to the stated requirements, students should discuss specific interest in pursuing a concurrent dual degree within two programs.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- Supplementary Application (https://drupal-base-s3-drupalshareds3-1qwpjwcnqwwsr.s3.amazonaws.com/gradschool/s3fs-public/uploads/admissionsforms/umd_supplementary_application_larc.pdf)
- Portfolio (Multimedia Requirements section of application)
- Must be admitted by both programs to pursue this dual degree.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	16 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	16 Jan

Other Deadlines: Please visit the program website at http://www.larch.umd.edu or http://www.arch.umd.edu

Requirements

- Landscape Architecture and Community Planning, Master of Landscape Architecture and Master of Community Planning (dual degree) (M.L.A. and M.C.P.) (p. 268)

Facilities and Special Resources

Please visit the program website at http://www.larch.umd.edu or http://www.arch.umd.edu.

Landscape Architecture and Community Planning, Master of Landscape Architecture and Master of Community Planning (dual degree) (M.L.A. and M.C.P.)

The dual master's program in Community Planning and Landscape Architecture combines key elements of the Master of Community Planning and the Master in Landscape Architecture. Student have two options for the Landscape Architecture portion of the dual degree. Those who did not major in landscape architecture as undergraduates will be enrolled the First MLA Professional Degree Curriculum. Those students who already have a bachelor's degree in Landscape Architecture will enroll in LARC's Post-Professional degree program.

Two-Year Post-Professional Degree Curriculum

• 60 credits required

Course	Title	Credits
Landscape Architecture courses		
LARC670	Landscape Architecture Theory and Criticism	3
LARC671	Landscape Architecture Research Methods	3
LARC660	Course LARC660 Not Found	3
LARC642	Graduate Studio III	5
LARC648	Graduate Studio IV	5
LARC748	Advanced Special Topics Studio	5
LARC799	Master's Thesis Research	6
or CREATIVE PI	Course CREATIVE PROJECT Not Found	
Community Planning courses		
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics	3
URSP673	Community Development	3
URSP708	Community Planning Studio	6
URSP709	Field Instruction	3
Total Credits		**60**

Three-Year First Professional Degree Curriculum

• 68 **credits required**

Students are required to complete a minimum of 68 credits. An additional 23 credits of leveling courses are required unless waived by the MLA program chair.

Course	Title	Credits
Landscape Architecture courses		
LARC641	Graduate Studio II	5
LARC642	Graduate Studio III	5

LARC648	Graduate Studio IV	5
LARC748	Advanced Special Topics Studio	5
LARC720	Environmental Analysis and Site Engineering	3
LARC721	Landscape Construction Methods and Materials	3
LARC670	Landscape Architecture Theory and Criticism	3
LARC671	Landscape Architecture Research Methods	3
LARC799	Master's Thesis Research	6
or ELECTIVES	Course ELECTIVES Not Found	
or OR CREATIV	Course OR CREATIVE PROJECT Not Found	
Community Planning courses		
URSP600	Research Design and Application	3
URSP601	Research Methods	3
URSP603	Land Use Planning: Concepts and Techniques	3
URSP604	The Planning Process	3
URSP605	Planning History and Theory	3
URSP606	Planning Economics (URSP688Z)	3
URSP688	Recent Developments in Urban Studies	3
URSP708	Community Planning Studio	6
URSP709	Field Instruction	3
Total Credits		**68**

Landscape Architecture (LARC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Master of Landscape Architecture (MLA) is a professional degree program that prepares students for work as design professionals in design firms, nonprofits, and governmental agencies. This program has been recognized by the National Center for Education Statistics as a STEM program under the category of 30.3301 - Sustainability Studies. MLA students take a series of lecture and studio design courses, beginning with an introduction to landscape design principles in the first year and culminating in an advanced research and studio design project in the graduating year. The three-year first professional degree curriculum is for students who have a bachelor's degree in a non-design field. The MLA is a degree that is accredited by the LAAB (Landscape Architecture Accreditation Board), which allows graduates to sit for the professional license exam (LARE). The two-year post-professional degree curriculum is for students who have a bachelor's degree in landscape architecture or a related design field.

The University of Maryland's MLA program is characterized by a balance of theory and practice to address the challenges of stormwater management, climate change, therapeutic landscapes, and environmental justice. Through the required courses, concentration electives, and individual research, each student will acquire a thorough theoretical basis, grounding in methods and practices, and exposure to contemporary local and global issues. The required studio courses and the thesis or creative project, conducted with faculty and community partners, advances the knowledge base of landscape architecture through research and community outreach activities.

Our extensive hands-on training and real-world creative problem-solving approaches provide you the knowledge, skills, and abilities needed to excel and make a difference. The studio experience provides an opportunity to implement ecological design solutions ranging from development, conservation, and restoration. From creating livable communities to solving environmental design problems, Landscape Architects are committed to helping shape the future while protecting the past.

The MLA program is interdisciplinary in its philosophy and its operation. Individual courses convey concepts and tools from diverse disciplines and studio, research, and outreach projects have a multi-discipline association. Project and research advisors come from faculty in Landscape Architecture, Plant Science, Environmental Science, Geography, Geology, American Studies, Architecture, Urban Studies and Planning, Historic Preservation, Real Estate Development, and other academic disciplines and professional partnerships.

The University of Maryland now offers a dual masters program in community planning (MCP) and landscape architecture (MLA) as well as a dual masters program in historic preservation (MHP) and landscape architecture (MLA). For more, please see our Masters of Landscape Architecture (https://larch.umd.edu/graduate/masters-landscape-architecture/) page.

Financial Assistance

A limited number of Graduate Assistantships are available to qualified students. These include Teaching, Research, and Administration Assistantships. Assistantships can be 9-month or 12-month appointments and include tuition remission (5 to 10 credits each semester, commensurate with GA appointment), an annual salary, health benefits, and in-state tuition, in exchange for 10 to 20 hours of work per week. Scholarships, fellowships, and other funding sources are available through a variety of external agents, such as the Landscape Architecture Foundation (LAF), the Garden Club of America (GCA), and others, including the following:

For more information on financial assistance and scholarships, please see our Student and Campus Resources (https://larch.umd.edu/student-and-campus-resources/) page.

Contact

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Courses: LARC (p. 891)

Relationships: Architecture (ARCH) (p. 51) Community Planning (CMPL) (p. 130) Historic Preservation (HISP) (p. 233) Landscape Architecture and Community Planning (LACP) (p. 267) Plant Science (PLSC) (p. 323)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationlarc.pdf)
- Supplementary Application 2
- Portfolio PDF Upload
- Description of Research/Work Experience (optional)

Portfolio

The portfolio is a compilation of graphic, written or scored work that you have created or observed and recorded. This collection should show your interest and aptitude for the visual language of design. Expertise in design is welcomed but not required. The portfolio should illustrate your interests in a variety of areas related to landscape architecture and environmental design. This portfolio should be uploaded digitally with your application. If you have any questions please email Diana Cortez at dcortez@umd.edu. **Portfolios are due no later than the application deadline.**

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 28, 2022	December 1, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 28, 2022	September 30, 2021

Other Deadlines: Please visit the program website at http://larch.umd.edu

Requirements

- Landscape Architecture, Master of Landscape Architecture (M.L.A.) (p. 270)

Facilities and Special Resources

The Master of Landscape Architecture program is accredited by the Landscape Architecture Accreditation Board (LAAB) of the American Society of Landscape Architects and meets the educational requirements for licensure in all 50 states and the District of Columbia. The program maintains a balance between design theory and application in a professional degree curriculum. The MLA program builds upon the strengths of the Department of Plant Science and Landscape Architecture (PSLA) and the Landscape Architecture Program (LARC). The PSLA Department is composed of faculty members who specialize in landscape architecture, landscape history, ecology, plant science, urban forestry, turf and golf course management, and landscape management. It provides a strong, comprehensive grounding for landscape design, planning and preservation, landscape assessment, site and ecological systems analysis, plant identification, plant conservation, and plant pathology. Other environmental programs in the College of Agriculture and Natural Resources offer knowledge and practical insight into the science of ecology, ecological restoration, water and soil conservation, and forest management. The MLA builds on this collaboration through advanced courses, student advising, and the contribution of non-teaching programs such as lectures, symposia and research projects.

The Master of Landscape Architecture Program is located in the Plant Sciences Building on the College Park campus. Advanced individual computing facilities, personal drafting stations, scanning and printing facilities, and a model-making workshop are available 24 hours a day, 7 days a week, to every student in the MLA program.

Landscape Architecture, Master of Landscape Architecture (M.L.A.)

Three-Year First Professional Degree Curriculum

• 47 credits required

Students are required to complete a minimum of 47 credits. An additional 23 credits of leveling courses are required unless waived by the MLA program chair. Students will be advised to take remedial Woody Plant Identification courses prior to arrival or in the first year of study at Maryland. The MLA Program requires these courses in order to meet accreditation standards.

Course	Title	Credits
LARC641	Graduate Studio II	5
LARC642	Graduate Studio III	5
LARC648	Graduate Studio IV	5
LARC748	Advanced Special Topics Studio	5
LARC720	Environmental Analysis and Site Engineering	3
LARC721	Landscape Construction Methods and Materials	3
LARC670	Landscape Architecture Theory and Criticism	3
LARC671	Landscape Architecture Research Methods	3
LARC799	Master's Thesis Research	6
Electives		9
Total Credits		**47**

Two-Year Post-Professional Degree Curriculum

• 39 credits required

This curriculum is for those students with a Bachelor of Landscape Architecture or other approved environmental design degree.

Course	Title	Credits
LARC660	Course LARC660 Not Found	3
LARC670	Landscape Architecture Theory and Criticism	3
LARC671	Landscape Architecture Research Methods	3
LARC642	Graduate Studio III	5
LARC648	Graduate Studio IV	5
LARC748	Advanced Special Topics Studio	5
LARC799	Master's Thesis Research	6
or CREATIVE PROJECT	Course CREATIVE PROJECT Not Found	
Electives		9
Total Credits		**39**

Leadership Education & Development (MPLD)

Graduate Degree Program
College: Education

This program is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.education.umd.edu

Admissions

This program is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Leadership Education & Development, Master of Professional Studies (M.P.S.) (p. 271)

Leadership Education & Development, Master of Professional Studies (M.P.S.)

This program is not currently accepting applications.

Library and Information Science (LBSC)

Graduate Degree Program
College: Information Studies

Abstract

The fully American Library Association (ALA) accredited Master of Library and Information Science (MLIS) program at the University of Maryland prepares graduates to be socially engaged and technologically focused information professionals, ready to create, educate, and innovate. The MLIS is a professional degree that provides students with a comprehensive foundation in both research and practice in library and information science. This foundation prepares students for careers with government agencies, archives, museums, libraries, startups, and any organization engaged in information activities.

At the iSchool we seek students who will serve as the next generation of leaders in information science and who will succeed in the dynamic and evolving global information society.

The MLIS program is designed for students from a wide variety of academic and career backgrounds, and is flexible enough to accommodate students working full or part-time. Students can complete their MLIS degree in-person, fully online, or through a hybrid approach.

Each student in the MLIS Program selects one of our unique specializations. Our specialization offerings are:

- Archives and Digital Curation
- Individualized Program Plan
- Diversity and Inclusion
- School Library
- Youth Experience
- Intelligence Analytics
- Legal Informatics

To request information about the MLIS program, please reach out to us at https://umdgrad.askadmissions.net/emtinterestpage.aspx?ip=umdinformationstudies or at mlisprogram@umd.edu.

Financial Assistance

For more information on financial aid, please visit the Financial Aid (https://ischool.umd.edu/academics/tuition-fees-graduate/) section of the College of Information Studies (https://ischool.umd.edu/) website.

Contact

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Website: https://ischool.umd.edu/

Courses: INFM (https://umd-curr.courseleaf.com/graduate/courses/infm/) INST (https://umd-curr.courseleaf.com/graduate/courses/inst/) LBSC (https://umd-curr.courseleaf.com/graduate/courses/lbsc/)

Relationships: Curation and Management of Digital Assets (online) (Z093) (p. 152) History and Library & Information Science (HILS) (p. 241) Human-Computer Interaction (HCIM) (p. 243) Information Management (INFM) (p. 249) Information Studies (INFS) (p. 252) Library and Information Science (online) (LBSO) (p. 252)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Management Admissions Test (GMAT) (optional)
- Graduate Record Examination (GRE) (optional)
- GRE Subject (optional)
- CV/Resume
- Supplementary Application Essay (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationlbsclbso2021.pdf)

Admission decisions are based upon a thorough review of the applicant's academic record, 3 letters of recommendation, resume/CV, a statement of purpose and a 500 word application essay. Other factors, such as other graduate degrees and work experience, may be considered.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 21, 2021	September 24, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 21, 2021	September 24, 2021

RESOURCES AND LINKS:

Program Website: https://ischool.umd.edu/
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Library and Information Science, Master of Library and Information Science (M.L.I.S.) (p. 272)

Facilities and Special Resources

The College operates six research centers: the Human-Computer Interaction Lab (HCIL), the Information Policy and Access Center (iPAC), and the Center for Advanced Study of Communities and Information (CASCI), the Cloud Computing Center (CCC), the Trace Center, and the Digital Curation Innovation Center (DCIC). iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS), the Maryland Institute for Technology in the Humanities (MITH), and the Computational Linguistics and Information Processing Laboratory (CLIP), as well as the Departments of Computer Science, English, and Sociology, the Robert H. Smith School of Business, and the College of Education.

Faculty and students participate in cooperative research with staff of the University Libraries, the Human-Computer Interaction Laboratory, and other campus units. Students have access through cooperative arrangements and programs to the resources of Archives II, the National Agricultural Library, the Library of Congress, and other prominent research facilities.

Library and Information Science, Master of Library and Information Science (M.L.I.S.)

Thesis option: 36 credits
Non-thesis option (Field Study): 36 credits

The MLIS degree requires 36 credit hours of academic work to be completed with a B minimum average within five calendar years from the first semester of registration. A full-time MLIS student usually completes the program in two years. The time limit for completion of all degree requirements is five years.

Students completing their MLIS courses in-person may take courses in the daytime and evening and may change from part-time to full-time and vice versa, as their circumstances permit. Most in-person MLIS courses are offered during the evening, but there are online sections offered on a rotating basis.

The History/Library Science (HILS) dual degree program requires 54 credit hours for the MLIS and MA in History. The time limit for completion of all degree requirements for this dual degree program is five years.

At least 24 credits of the 36 required credits must be courses taken in the College (LBSC, INST, or INFM). A student may take courses in other UMCP departments or through the Consortium at other area institutions (limit of six credits). Six credits may be transferred from another accredited graduate program. Up to 9 credits earned as an Advanced Special Student at UMCP may be applied to the degree. Information about policies and procedures governing degree requirements and courses taken outside the College is available from the College's Student Services Office and on the College's website at http://ischool.umd.edu/graduate-student-services (http://ischool.umd.edu/graduate-student-services/).

Course	Title	Credits
Core Requirements:		
LBSC602	Serving Information Needs	3
LBSC631	Achieving Organizational Excellence	3
LBSC671	The Lifecycle of Information	3
LBSC791	Designing Principled Inquiry	3
Thesis or Non-Thesis Requirements:		
Select one of the following:		9
Thesis:		
INST701	Introduction to Research Methods	
LBSC799	Master's Thesis Research	
Non-thesis:		
LBSC703	Field Study in Archives and Digital Curation	
or LBSC707	Field Study in Information Service	
Electives		
Specialization Requirements:		
Select one of the following:		15
Archives and Digital Curation		
Diversity and Inclusion		
Youth Experience		
Legal Informatics		
Intelligence and Analytics		
Individualized Program Plan		
School Library		
Total Credits		**36**

Library and Information Science (online) (LBSO)

Graduate Degree Program
College: Information Studies

Abstract

The fully American Library Association (ALA) accredited Master of Library and Information Science (MLIS) program at the University of Maryland prepares graduates to be socially engaged and technologically focused information professionals, ready to create, educate, and innovate.The MLIS is a professional degree that provides students with a comprehensive foundation in both research and practice in library and information science. This foundation prepares students for careers with government agencies, archives, museums, libraries, startups, and any organization engaged in information activities.

At the iSchool we seek students who will serve as the next generation of leaders in information science and who will succeed in the dynamic and evolving global information society.

The MLIS program is designed for students from a wide variety of academic and career backgrounds, and is flexible enough to accommodate students working full or part-time.

Each student in the MLIS Program selects one of our unique specializations. Students who pursue the "Individualized Program Plan" may create their own course plan. Specialization offerings include:

- Archives and Digital Curation
- Diversity and Inclusion
- Individualized Program Plan
- Intelligence Analytics
- Legal Informatics
- School Library
- Youth Experience

If you would like more information about the MLIS program online, please contact us at mlisprogram@umd.edu.

Financial Assistance

For more information on financial aid, please visit the Financial Aid (https://ischool.umd.edu/academics/tuition-fees-graduate/) section of the College of Information Studies (https://ischool.umd.edu/) website

Contact

Student Services Office, College of Information Studies
4110 Hornbake Building, South Wing
4130 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4915
Fax: 301.314.9145
Email: mlisprogram@umd.edu

Website: https://ischool.umd.edu/

Courses: INFM (https://umd-curr.courseleaf.com/graduate/courses/infm/) INST (https://umd-curr.courseleaf.com/graduate/courses/inst/) LBSC (https://umd-curr.courseleaf.com/graduate/courses/lbsc/)

Relationships: Curation and Management of Digital Assets (online) (Z093) (p. 152) History and Library & Information Science (HILS) (p. 241) Human-Computer Interaction (HCIM) (p. 243) Information Management (INFM) (p. 249) Information Studies (INFS) (p. 252) Library and Information Science (LBSC) (p. 271)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Management Admissions Test (GMAT) (optional)
- Graduate Record Examination (GRE) (optional)
- GRE Subject (optional)
- CV/Resume
- Supplementary Application Essay (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationlbsclbso2021.pdf)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 21, 2021	September 24, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 21, 2021	September 24, 2021

RESOURCES AND LINKS:

Program Website: https://ischool.umd.edu/
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Library and Information Science, Master of Library and Information Science (M.L.I.S.) (p. 274)

Facilities and Special Resources

The College operates six research centers: the Human-Computer Interaction Lab (HCIL), the Information Policy and Access Center (iPAC), and the Center for Advanced Study of Communities and Information (CASCI), the Cloud Computing Center (CCC), the Trace Center, and the Digital Curation Innovation Center (DCIC). iSchool faculty and doctoral students also participate in or have affiliations with the University of Maryland Institute for Advanced Computer Studies (UMIACS), the Maryland Institute for Technology in the Humanities (MITH), and the Computational Linguistics and Information Processing Laboratory (CLIP), as well as the Departments of Computer Science, English, and Sociology, the Robert H. Smith School of Business, and the College of Education.

Faculty and students participate in cooperative research with staff of the University Libraries, the Human-Computer Interaction Laboratory, and other campus units. Students have access through cooperative arrangements and programs to the resources of Archives II, the National Agricultural Library, the Library of Congress, and other prominent research facilities.

Library and Information Science, Master of Library and Information Science (M.L.I.S.)

Thesis option: 36 credits
Non-thesis option (Field Study): 36 credits

The MLIS degree requires 36 credit hours of academic work to be completed with a B minimum average within five calendar years from the first semester of registration. A full-time MLIS student usually completes the program in two years. The time limit for completion of all degree requirements is five years.

Students completing their MLIS courses in-person may take courses in the daytime and evening and may change from part-time to full-time and vice versa, as their circumstances permit. Most in-person MLIS courses are offered during the evening, but there are online sections offered on a rotating basis.

The History/Library Science (HILS) dual degree program requires 54 credit hours for the MLIS and MA in History. The time limit for completion of all degree requirements for this dual degree program is five years.

At least 24 credits of the 36 required credits must be courses taken in the College (LBSC, INST, or INFM). A student may take courses in other UMCP departments or through the Consortium at other area institutions (limit of six credits). Six credits may be transferred from another accredited graduate program. Up to 9 credits earned as an Advanced Special Student at UMCP may be applied to the degree. Information about policies and procedures governing degree requirements and courses taken outside the College is available from the College's Student Services Office and on the College's website at http://ischool.umd.edu/graduate-student-services (http://ischool.umd.edu/graduate-student-services/).

Course	Title	Credits
Core Requirements:		
LBSC602	Serving Information Needs	3
LBSC631	Achieving Organizational Excellence	3
LBSC671	The Lifecycle of Information	3
LBSC791	Designing Principled Inquiry	3
Thesis or Non-Thesis Requirements:		
Select one of the following:		9
Thesis:		
INST701	Introduction to Research Methods	
LBSC799	Master's Thesis Research	
Non-thesis:		
LBSC703	Field Study in Archives and Digital Curation	
or LBSC707	Field Study in Information Service	
Electives		
Specialization Requirements:		
Select one of the following:		15
Archives and Digital Curation		
Diversity and Inclusion		
Youth Experience		
Legal Informatics		
Intelligence and Analytics		
Individualized Program Plan		
School Library		
Total Credits		**36**

Linguistics (LING)

Graduate Degree Program
College: Arts and Humanities

Abstract

Research on language has proven to be one of the most fruitful means to cast light on the nature of human cognition. Building on recent developments in the field, the Maryland Linguistics (https://linguistics.umd.edu) program trains students to pursue and answer research questions about language as a component of the mind. How do particular languages reflect general properties of our linguistic capacity?

How is this capacity instantiated in the mind, as a computational, psychological or neurological system? How does it reflect properties which are encoded genetically, and how does it support the acquisition of languages by young children? And how can linguistic knowledge be used to improve human language technology?

The Department of Linguistics (https://linguistics.umd.edu) at the University of Maryland has an internationally recognized Ph.D. program. The Department combines current theoretical research in phonology, morphology, syntax, semantics with state-of-the-art experimental research in psycholinguistics, first language acquisition, language processing, neurolinguistics, and computational linguistics. An interdisciplinary background enables students to evaluate proposals critically and make a lasting contribution to the field. Many students choose to split their major and minor areas between theoretical and experimental linguistics. Many students also choose to concurrently pursue the Certificate Program in Neuroscience and Cognitive Science (https://nacs.umd.edu/landingtopic/nacs-certificate/). The department also hosts an NSF-supported interdisciplinary training program on "Biological and Computational Foundations of Language Diversity" (see website for more information).

The Department encourages applications from students with an interest in the Department's areas of expertise.

Students with a primary interest in Neurolinguistics and Cognitive Science may also want to consider applying to the Neuroscience and Cognitive Science (https://nacs.umd.edu/) (NACS) Ph.D. program.

Students seeking a Ph.D. in other areas of linguistics may want to consider a range of other strong programs at the University of Maryland. The PhD program in Second Language Acquisition (https://sllc.umd.edu/sla/), based in the School of Languages, Literatures and Cultures, has a strong cognitive science and research focus. Students with a focus on ESL should consider the Applied Linguistics and Language Education Program (https://education.umd.edu/academics/departments/tlpl/llsi/applied-linguistics-and-language-education-phd/), based in the College of Education. Students with a clinical focus should also consider the Hearing and Speech Sciences Program (https://hesp.umd.edu/).

Students interested in human language technology and computational linguistics should also consider the PhD programs in the iSchool (https://ischool.umd.edu/) or the Department of Computer Science (p. 137). The Computational Linguistics and Information Processing (https://wiki.umiacs.umd.edu/clip/index.php/Main_Page/) (CLIP) laboratories contain state of the art computing facilities and data resources.

Financial Assistance

Initial offers of admission and financial aid are normally made in February-April. Further offers are sometimes made at a later date, if additional funds become available. In recent years, approximately 6-8 new students have started the Ph.D. program each year.

Financial aid (tuition + stipend) is available on a competitive basis. The department aims to provide graduate students with financial aid (stipend + tuition) during their full course of study (5 years), provided that the student makes satisfactory academic progress. Graduate funding comes from a number of sources. The Department offers Graduate Assistantships (GAs) and Research Assistantships (RAs). GAs typically involve teaching service in undergraduate linguistics courses. RA positions typically involve research associated with a grant-supported faculty research project. Also available are Graduate Fellowships. The University offers a number of these to outstanding applicants, which release the student from GA or RA responsibilities for 1-2 years of study. Other sources of funding are occasionally available through the Department or University. Also, a number of students come to the Department with funding of their own from external fellowships.

Fellowships and GAs generally provide 10 credits of tuition remission respectively per semester. In additions to tuition remission, the Graduate Assistantship comes with Health benefits. The student is responsible for approximately $440.00 in mandatory student fees per semester.

The Department sets aside a portion of its operating budget to support travel by faculty and graduate students to present papers at conferences. Any member of the Department can request support for this purpose. Graduate students may also apply for university travel awards for this purpose.

Contact

The Department's website, Maryland Linguistics (https://linguistics.umd.edu), contains a good deal of information on the program, but if you have further questions about Graduate Study in the Department, you should contact Dr. Jeffrey Lidz (jlidz@umd.edu). Alternatively, if you have a particular interest in the research of an individual faculty member, you may want to contact that person directly via email.

Jeffrey Lidz, Ph.D.
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University of Maryland
College Park, MD 20742
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Fax: 301.405.7104
Email: jlidz@umd.edu

Website: https://linguistics.umd.edu

Courses: LING (p. 897)

Relationships: Hearing and Speech Sciences (HESP) (p. 229) Neurosciences and Cognitive Science (NACS) (p. 312) Second Language Acquisition (SLPH) (p. 368)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationling2021.pdf)
- Writing Sample: Up to 3 sample submissions, uploaded to the Upload Requirements section of the application.

All students must hold a Bachelors or Masters degree (or international equivalent) prior to starting the Ph.D. program. Although the student's previous degrees may be in a field other than linguistics, it is essential that a student have some previous experience in linguistics.

Applicants should check the University's admission requirements (https://gradschool.umd.edu/admissions/) and the department's web site (https://linguistics.umd.edu/academic-programs/graduate/) for the most up-to-date information on graduate applications. Electronic submission of application materials is strongly preferred. Applicants are encouraged to submit the initial on-line application form well before the application deadline, preferably by mid-December, since this form must be processed before an applicant is able to submit other electronic materials. Note that the January 7th target date applies to all applicants, domestic and international.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	8 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	8 Jan

Other Deadlines: Please visit the program website at https://linguistics.umd.edu

Requirements

- Linguistics, Doctor of Philosophy (Ph.D.) (p. 276)
- Linguistics, Master of Arts (M.A.) (p. 276)

Facilities and Special Resources

In addition to university and departmental library facilities, linguists at Maryland have ample office and meeting spaces. The department has outstanding resources for interdisciplinary research (https://linguistics.umd.edu/research/) that bridges theoretical, experimental, and computational linguistics. The Cognitive Neuroscience of Language (CNL) Laboratory has the specific purpose of bridging the gap between theoretical/computational models of human language and the brain-level mechanisms that support language. The research in the CNL Lab combines the study of linguistics, cognitive neuroscience, language acquisition and psycholinguistics, genetic disorders and computational modeling. The CNL Lab is housed in around 5000 sf. of labs and offices and includes the following:

1. Event-Related Potentials (ERP) Lab: 128-channel Neuroscan ERP facility for recording electrical signals originating in the brain by measuring electrical activity at the scalp.
2. Magnetoencephalography (MEG) Lab at the Maryland Neuroimaging Center: a 160-channel whole-head MEG facility that is used for non-invasive measurements of the magnetic fields associated with neuronal activity in the brain.
3. Head-mounted Eye Tracking Lab: lightweight eye-tracker suitable for use with children and adults.
4. Fixed Eye Tracking Lab: eye-tracker suitable for on-line studies of reading.
5. Center for Young Children: state-of-the-art on-campus preschool for 3-6 year olds, with testing rooms suitable for study of language acquisition.
6. Infant Language Lab: for testing infants and young children.
7. Phonetic/Speech Analysis facilities: equipment for generation, recording, manipulation and analysis of speech sounds.

In addition to the facilities available at the CNL Lab itself, Maryland linguists have taken advantage of the many additional research opportunities in closely affiliated departments and institutions, in particular at the National Institutes of Health (NIH), located in nearby Bethesda, Maryland. These include fMRI brain imaging, PET brain imaging and TMS (transcranial magnetic stimulation) at NIH, and aphasia research in collaboration with NIH researchers.

Linguistics, Master of Arts (M.A.)

Under exceptional circumstances, students are awarded an MA degree on completion of the core coursework requirements (six courses, see PhD requirements), four further classes, and writing either an MA thesis which is defended publicly (LING799) or two comprehensive papers in different areas of language study (LING798). Two of the post core-level class requirements should be taken in the Department of Linguistics, with the rest being taken either in Linguistics or in other departments satisfying a secondary area of specialization and complementing the student's work. **Note that the Department of Linguistics does not normally admit students whose objective is a terminal M.A. degree.** The M.A. degree primarily serves students who withdraw from the Ph.D. program.

Linguistics, Doctor of Philosophy (Ph.D.)

Students pursuing the Ph.D. take at least 33 graduate-level credits of course-work, of which at least 9 credits are at the 800-level (seminars) and 6 credits correspond to the Minor area of specialization, possibly in another department. These minimum requirements are usually fulfilled by formal classes and not by independent studies, although the latter may be used to supplement a student's program of study. The student's first year is normally devoted to the 'core', foundational coursework in the department's three primary research areas:

1. theoretical linguistics (syntax, semantics, phonology),
2. psycholinguistics/neurolinguistics/language acquisition,
3. computational linguistics.

In addition to satisfying (part of) the 9 credit requirement for seminars, the next two years are devoted to satisfying 6 credits (beyond any core courses) in the Minor, as approved by the Graduate Director. Some students choose to pursue the Certificate in Neuroscience and Cognitive Science, which may count as the minor area. To help ensure satisfactory progress towards the degree, students are required to submit to the Graduate Director a Ph.D. Roadmap once each semester, completed in consultation with their advisor.

Advance to Candidacy: By their fifth semester, students write a substantial paper LING888, under the supervision of a faculty member. This paper enables students to demonstrate a capacity for productive research and to make an original contribution to the literature, often forming the basis for the dissertation research. It is submitted to a three

member examining committee, is defended publicly two weeks later, and must be approved by the committee after the defense. The student must then upload the completed paper to the folder in the department PDF locker, and inform the Graduate Director that this has been done.

In addition, by their seventh semester students must also write a paper in their Minor area of specialization (or some other area that is not their major area). The paper must be prepared under the supervision of a member of the faculty. Once the paper is completed to the satisfaction of the supervising faculty member, it must be uploaded to the 896 folder in the department PDF locker, and the Minor Area Paper approval form presented to the Graduate Director. [Under special circumstances, upon the written recommendation of the student's advisor and with the approval of the faculty of the department, a student may satisfy the Minor area paper requirement by instead taking a third course in the Minor area.]

LING888 and the Minor area paper replace the 'comprehensive examinations' held in some departments.

Post-Candidacy: After satisfactory completion of the 895 paper, students are admitted to candidacy and write a proposal for a dissertation, which a faculty member agrees to supervise. Students enroll in LING899 while working on the dissertation, and must take at least 12 credits of this course. The dissertation must make a substantial and original contribution to knowledge. The supervisor, in consultation with other committee members (selected by the student and the supervisor), determines when there is a draft which will be defended publicly at an oral examination. The dissertation is approved by a five member examining committee. On completion of the approved dissertation, a hard copy will be submitted to the department, along with a 2nd hard copy or else an electronic version for the department web page.

Course	Title	Credits
Required coursework:		
LING800-level electives		9
Minor area courses		6
LING888	Doctoral Research Paper	6
Select one of the following sequences:		6
Syntax:		
LING610 & LING611	Syntactic Theory and Issues in Syntax	
Phonology:		
LING620 & LING621	Phonological Theory and Issues in Phonology	
Semantics:		
LING660 & LING661	Introduction to Semantics and Issues in Semantics	
Select one additional sequence from the following:		6
Psycholinguistics:		
LING640 & LING641	Psycholinguistics and Issues in Psycholinguistics	
Computational Linguistics:		
LING723 & LING773	Natural Language Processing and Computational Linguistics II	
Select two additional courses from any unselected sequence		6
Dissertation Research Requirements		
LING899	Doctoral Dissertation Research	12
Total Credits		**51**

Literacy Coaching (Z038)

Graduate Certificate Program
College: Education

Abstract

The Department of Curriculum and Instruction's (EDCI) literacy coach post-baccalaureate graduate certificate program is designed to prepare experienced, highly qualified middle and high school teachers to serve as literacy coaches in low performing middle and high schools. Literacy coaches are skilled content area collaborators who function effectively in middle school and/or high school settings for secondary teachers in the core content areas of English language arts, mathematics, science, and social studies. They are skilled evaluators of literacy needs within various subject areas and are able to collaborate with secondary school leadership teams and teachers to interpret and use literacy assessment data to inform instruction. Finally, literacy coaches are accomplished middle and high school teachers who are skilled in developing and implementing instructional strategies to improve academic literacy in the four targeted content areas. The program courses focus on

1. reading, cognition, and instruction across content areas,
2. diagnostic reading assessment and instruction,
3. teaching ESOL reading and writing in secondary content areas,
4. assessing, diagnosing, and teaching writing across content areas,
5. TESOL, special education, and assistive technology, and
6. coaching and mentoring teachers.

In addition, literacy coach candidates participate in school district professional development workshops mapped onto the literacy coach coursework. The EDCI literacy coach program addresses the Standards for Middle and High School Literacy Coaches (International Reading Association, 2006). Upon successful completion of the literacy coach program, candidates receive a graduate literacy coach certificate from the University of Maryland.

Contact

Elizabeth E. Johnson
Coordinator
Department of Curriculum and Instruction (EDCI)
2311 Benjamin Building
2942 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3153
Fax: 301.314.9055
Email: ejohnson@umd.edu

Wayne Slater, Ph.D.
Department of Curriculum and Instruction (EDCI)
2311 Benjamin Building
3942 Campus Drive
University of Maryland
College Park MD, 20742
Telephone: 301.405.3128
Fax: 301.314.9055

Email: wslater@umd.edu

Website: http://www.education.umd.edu

Courses: EDCI (https://umd-curr.courseleaf.com/graduate/courses/edci/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)

Applicants should be highly qualified middle or high school teachers.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	5 Mar	4 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Literacy Coaching, Post-Baccalaureate Certificate (P.B.C.) (p. 278)

Literacy Coaching, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

The Post-Baccalaureate Certificate in Literacy Coaching is a six week program designed to prepare experienced, highly qualified middle and high school teachers to serve as literacy coaches in low performing middle and high schools. It is a joint program between the University of Maryland (UM)/Baltimore City Public Schools (BCPS City Schools)/ Montgomery County Public Schools (MCPS)/Prince George's County Public Schools (PGCPS) serving cohorts of selected middle and high school teachers.

Course	Title	Credits
Required courses:		
EDCI785	Course EDCI785 Not Found	3
TLPL661	Multiliteracies: Theory and Practice	3
TLPL640	Assessing, Diagnosing, and Teaching Writing	3
TLPL656	Teaching Culturally and Linguistically Diverse Exceptional Learners	3
TLPL647	Diagnostic Reading Assessment and Instruction	3
TLPL641	Reading, Cognition, and Instruction: Reading in the Content Areas I	3
Total Credits		**18**

Marine, Estuarine, and Environmental Sciences (MEES)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The specific objective of the university-wide Graduate Program in Marine-Estuarine-Environmental Sciences (MEES) is the training of qualified graduate students, working toward the M.S. or Ph.D. degree, who have research interests in fields of study that involve interactions between biological, physical and chemical systems in the marine, estuarine, freshwater or terrestrial environments. The MEES curriculum provides a balance of disciplinary strength and interdisciplinary perspective, designed for environmental issues in the 21st century. The MEES Curriculum is designed around four interdisciplinary Foundational Areas: 1) Environment and Society (http://mees.umd.edu/environment-and-society-page/); 2) Earth and Ocean Sciences (http://mees.umd.edu/earth-ocean-sciences-page/); 3) Ecological Systems (http://mees.umd.edu/ecological-systems/), and 4) Environmental Molecular Science and Technology (http://mees.umd.edu/environmental-molecular-science-technology/).

Financial Assistance

University fellowships, research assistantships and traineeships, and teaching assistantships are available. In general, aid provides for full living and educational expenses. Some partial assistance may also be available. Research support from federal, state, and private sources often provides opportunities for additional student support through either research assistantships or part-time employment on research projects.

Contact

Timothy Canty, Ph.D.
Director, MEES Graduate Program
3427 Atlantic Building
4254 Stadium Drive
College Park, MD 20740
Telephone: 301-405-5360
Email: tcanty@umd.edu

Website: http://www.mees.umd.edu

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmees.pdf)

It is particularly important that a student articulate clearly, in the application, a statement of goals and objectives for future work in the field. Because of the interdisciplinary and interdepartmental nature of the program, only students for whom a specific advisor is identified in advance can be admitted. Prior communication with the faculty in your choice Foundation is highly encouraged.

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	14 Jan	01 Oct
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Jan	30 Sept

Other Deadlines: Please visit the program website at http://www.mees.umd.edu

Requirements

- Marine, Estuarine, and Environmental Sciences, Doctor of Philosophy (Ph.D.) (p. 280)
- Marine, Estuarine, and Environmental Sciences, Master of Science (M.S.) (p. 279)

Facilities and Special Resources

Students may conduct their research in the laboratories and facilities of the College Park (UMCP), Baltimore (UMB), Baltimore County (UMBC), or Eastern Shore (UMES) campuses, in one of the laboratories of the University's Center for Environmental Studies (UMCES): the Chesapeake Biological Laboratory (CBL) at Solomons, Maryland; the Horn Point Laboratory (HPL) near Cambridge, Maryland; and the Appalachian Laboratory (AL) in Frostburg, Maryland; or at the Institute of Marine and Environmental Technology (IMET) in Baltimore. CBL and HPL are located on the Chesapeake Bay. They include excellent facilities for the culture of marine and estuarine organisms. Berthed at CBL are the University's research vessels. At HPL there are extensive marshes, intertidal areas, oyster shoals, tidal creeks, and rock jetties. AL, located in the mountains of western Maryland, specializes in terrestrial and freshwater ecology. On the campuses and at IMET are specialized laboratory facilities for environmental research, including microbiology; biotechnology; water chemistry; cellular, molecular, and organismal biology; and specialized facilities for remote sensing of the environment. Extensive field sites for environmental research are available through the University's agricultural programs and through cooperation with many other organizations in the state.

Marine, Estuarine, and Environmental Sciences, Master of Science (M.S.)

Thesis option only: 30 credits

A minimum of 30 credits with 24 credits of course work and 6 credits of graduate research, MEES799. Of the 24 course credits, 12 of them must be at the 600 level or higher; including MEES601.

Initial Advisory Meeting

A three member Research Advisory Committee is to be formed during the first semester and meets with the student to discuss the student's progress (mainly coursework, but also basic research interests). A report of this meeting must be filed with the MEES Program Office by the end of the student's second semester (Form can be found here (https://www.mees.umd.edu/s/Initial-Advisory-Committee-Rpt-Foundation.pdf)).

Annual Committee Report

Every year that the student is in residence, committee meetings are to be held in order for the committee to review academic and research progress. Reports of these meetings are due annually to the MEES Program by September 30th. Annual Committee Report Forms can be found here. (https://www.mees.umd.edu/s/Annual-Report-Form.pdf)

Thesis

An Oral Defense of the Thesis, administered according to Graduate School regulations, will take place at the completion of the research project. This defense will be conducted by the Advisory Committee and will be administered once all other degree requirements have been fulfilled.

The Thesis Defense will generally last no longer than two hours, but the time will be long enough to ensure an adequate examination. The Research Advisory Committee also approves the thesis, and it is the candidate's obligation to see that each member of the committee has at least two weeks in which to examine a copy of the thesis prior to the time of the defense.

The Research Advisory Committee may conclude that the candidate has passed or failed. A student may be conditionally passed with the provision that minor changes in the thesis be made and approved by the Major Advisor. A student who fails may at the discretion of the committee and with approval of the MEES Director and the appropriate Graduate School be permitted to stand a second defense after acting on suggestions for improvement of the thesis (collection of more data, use of different statistical analysis, rewriting of the discussion, etc.), at such time as the advisor considers appropriate. Once the thesis has been successfully defended, one copy must be supplied to the MEES Office in addition to the copies required by the Graduate School.

More information can be found on the MEES program website (https://www.mees.umd.edu/current-ms-req-1/).

Course	Title	Credits
Core Requirements		
30 credits of coursework including:		30
MEES799	Masters Thesis Research	

MEES601	Course MEES601 Not Found (Applied Environmental Sciences)
One seminar for each year of residence in program	
Two professional development courses	
Foundation options:	
Students select one of the following foundations and complete the requirements:	
Environment and Society:	
MEES620	Environment and Society
Electives	
Earth & Ocean Science:	
MEES640	Interconnected Earth Systems: Land, Ocean, and Estuary
Electives	
Ecological Systems:	
MEES660	Ecological Systems
Electives	
Environmental Molecular Science & Technology:	
MEES680	Cell and Molecular Biology for the Environmental Scientist- From Genes to Ecosystems
Electives	
Total Credits	**30**

Marine, Estuarine, and Environmental Sciences, Doctor of Philosophy (Ph.D.)

The student must complete a minimum of 36 credits, with at least 24 credits of course work and 12 credits of dissertation research. Twelve credits of course work must be at the 600 level or above. Coursework completed to fulfill a Master's degree can be applied towards this requirement, up to a maximum of 16 credits. Required course work includes

1. one seminar course (MEES608 or equivalent) is required for each year in residence (on average);
2. one approved Statistics course (600 level or higher);
3. one graduate course representing significant interdisciplinary breadth, outside the student's specialization;
4. one course or seminar in management, ethics or philosophy of science.

Initial Advisory Meeting
A five member Research Advisory Committee is to be formed during the first semester and meets with the student to discuss the student's progress (mainly coursework, but also basic research interests). This committee will follow the student throughout their tenure in the program. A report of this meeting must be filed with the MEES Program Office by the end of the student's second semester (Form can be found here).

Annual Committee Report
Every year that the student is in residence, committee meetings are to be held in order for the committee to review academic and research progress. Reports of these meetings are due annually to the MEES Program by September 30th. Annual Committee Report Forms can be found here.

Comprehensive Examination
The Research Advisory Committee is responsible for administering the comprehensive examination. Since this examination must be successfully completed before the dissertation proposal can be defended, it is in the student's best interests to take the Comprehensive Examination as early as possible in the Program. However, the exam must be taken by the end of the student's sixth semester. This examination is intended to determine whether the student demonstrates sufficient evidence of scholastic and intellectual ability in major and related academic areas. The examination will not be a defense of the research proposal.

Dissertation Proposal Defense
The Proposal Defense is an oral examination on the research proposal administered by the Research Advisory Committee. At least 2 weeks prior to the examination, the student must supply the committee members with a formal research proposal in which the following is detailed: background information, research progress to date (if any), specific objectives, and experimental design of the proposed research.

Advance to Candidacy
In addition to the course requirements below, students must successfully complete both the Comprehensive Examinations and the Defense of the Dissertation Proposal. Once the student applies and is approved to advance, they must nominate a dissertation committee.

Post-Candidacy
In addition to completing at least 12 credits of MEES899, a candidate for the Ph.D. degree will present a public seminar on the dissertation research during the academic year in which the degree will be awarded. Students expecting degrees at the end of the summer must be scheduled for presentation before the end of May. The student and Advisor will be responsible for initiating arrangements through the MEES Office for the date and advertisement of advertisement of the seminar. The seminar will be open to faculty, students, and other interested parties. The final oral defense of the dissertation is conducted by the Dissertation Examining Committee.

More information can be found on the MEES program website (https://www.mees.umd.edu/current-doc-req-1/).

Course	Title	Credits
Core Requirements		
Coursework must include the following:		24
MEES608	Seminar in Marine-Estuarine-Environmental Sciences	
One approved statistics course		
One graduate course outside of the chosen specialization		
One course or seminar in Environmental Management		
Dissertation Reseach Requirement		
MEES899	Doctoral Dissertation Research	12
Total Credits		**36**

Marketing Analytics (BMMA)

ABSTRACT

Maryland Smith's Master of Science in Marketing Analytics program teaches you how to collect, analyze and interpret massive amounts of consumer data to help businesses engage with the right audiences and launch cost-effective campaigns that work.

- Use cutting-edge tools and programming languages to analyze big data and solve marketing challenges for real businesses.
- Connect with other talented students from diverse academic backgrounds and boost your skills under the guidance of expert faculty.
- Participate in data competitions and network with top employers who hire our students.

Financial Assistance

Financial aid is available to qualified students in the form of fellowships, graduate assistantships, and scholarships.

Contact

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: smithmasters@umd.edu

Website: http://www.rhsmith.umd.edu

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	May 24, 2022

RESOURCES AND LINKS:

Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Marketing Analytics, Master of Science (M.S.) (p. 281)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database. The OCS also participates in regional and national career forums and job fairs.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Marketing Analytics, Master of Science (M.S.)

Non-thesis only: 30 credits required

The MS in Marketing Analytics will give you the cutting-edge knowledge and skills you need to apply marketing analytics to daily business practice. The program will provide you with an in-depth understanding of the mathematical and statistical models and tools needed for customer analysis in the context of marketing problems.

Course	Title	Credits
Required courses:		
BUMK720	Marketing Strategy	3
BUMK724	Customer Analysis	3
BUMK726	Statistical Programming for Customer Analytics	3
BUMK760	Business Policies and Ethics	2
BUMK742	Advanced Marketing Analytics	3
BUMK762	Business Communication I	1
BUMK746	Data Science for Customer Analytics	3
BUMK744	Marketing Research and Analytics	3
BUMK764	Business Communications II	1
BUMK758	Special Topics in Marketing (BUMK758Q - Action Learning Project)	2
Application electives		6
Total Credits		**30**

Materials Science and Engineering (ENMA)

Graduate Degree Program
College: Engineering

Abstract

Materials Science and Engineering is an interdisciplinary program. Students from engineering and science disciplines receive a solid foundation in the physics and chemistry of materials, thermodynamics and structure of materials, as well as the latest technological aspects of materials in today's manufacturing environment. Faculty research areas are mainly concentrated in the development of novel materials for today's electronics, energy, biomedical and high tech industries. These materials may be bulk or thin film format and range from ceramics, semiconductors, metals, polymer and biomaterials. Departmental faculty members are major participants in the University of Maryland Materials Research Science and Engineering Center (http://mrsec.umd.edu/), the Maryland NanoCenter (https://www.nanocenter.umd.edu/)

and the University of Maryland Energy Research Center (http://www.umerc.umd.edu/). For an overview of the Materials Science and Engineering Department, please visit Materials Science and Engineering at the University of Maryland (http://www.mse.umd.edu/).

Financial Assistance

Financial assistance in the form of teaching and research assistantships and sponsored fellowships are available to qualified students. Requests for financial assistance will be considered for Fall admission only.

Contact

Ichiro Takeuchi
Graduate Program Director
Department of Materials Science and Engineering
1242 Jeong H. Kim Engineering Building
8228 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6809
Email: enmagrad@deans.umd.edu

Website: http://www.mse.umd.edu

Courses: ENMA (https://umd-curr.courseleaf.com/graduate/courses/enma/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations

The Department offers graduate study leading to the Master of Science (thesis or non-thesis options) and Doctor of Philosophy degrees. In addition, students enrolled in the Professional Master of Engineering program may choose Materials Science and Engineering as a program option. Graduate study is open to qualified students holding a bachelor's degree from accredited programs in any of the engineering and science areas. For detailed admissions and program information, please visit Materials Science and Engineering Graduate Programs (http://www.mse.umd.edu/graduate/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 7, 2022	October 1, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	January 7, 2022	September 30, 2021

RESOURCES AND LINKS:
Program Website: http://www.mse.umd.edu
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Materials Science and Engineering, Doctor of Philosophy (Ph.D.) (p. 283)
- Materials Science and Engineering, Master of Science (M.S.) (p. 283)

Facilities and Special Resources

Special equipment includes scanning and transmission electron microscopes; X-ray diffraction devices; image analysis and mechanical testing facilities; crystal growing, thin film deposition and analysis equipment; HPLC, GC, IR and other sample preparation and analytical apparatus.

The Laboratory for Advanced Materials Processing (LAMP) in JM Patterson 2225 includes a class 1000 clean room for various kinds of thin film processing, particularly things difficult to acccomplish in the NanoCenter's new FabLab clean room in the Kim Building. LAMP also features custom-designed ultraclean chemical vapor deposition (CVD) and atomic layer deposition (ALD) equipment as the basis for research in nano applications and manufacturing process prototyping, particularly with real-time chemical sensing for metrology and process control. A custom wafer-scanning electrical characterization facility enables resistance and capacitance mapping.

The Nano-Bio Systems Laboratory (NBSL) in JM Patterson 2229 adjoins LAMP and provides capability for biotech research, specifically in biomaterials processing and biomicrosystems development. It includes a Zeiss 310 laser confocal/fluorescence microscope, microfluidic chip testing for biomolecular reaction and cellular response experiments, biomaterials deposition, a Zyvex L200 nanomanipulator system for life science studies, and mass spectrometry and ICP optical emission equipment.

The W. M. Keck Laboratory for Combinatorial Nanosynthesis and Multiscale Characterization in 1141 Kim Building houses several thin film deposition chambers for rapid exploration of novel functional materials. The combinatorial approach allows simultaneous investigation of large numbers of different samples. The combinatorial laser molecular beam epitaxy is used to perform atomic layer controlled combinatorial synthesis of functional materials. Atomically controlled growth of unitcells are monitored in-situ using electron diffraction.

The Advanced Imaging and Microscopy Laboratory (AIM), located in 1237 Jeong H. Kim Building, houses the most electron powerful microscopes within any university in the Washington, DC metro area. The facility has a Field-emission Transmission Electron Microscope (TEM) with 1.4 angstrom resolution and can generate chemical-composition maps of materials using Energy-Dispersive X-Ray Spectroscopy (EDS) or Electron Energy-Loss Spectroscopy (EELS). Also housed in the lab are a thermionic TEM with 2.0 angstrom resolution (capable of in-situ electrical measurements and in-situ observations between -183 C and

1000C) and an electron microprobe with five Wavelength-Dispersion X-Ray Spectrometers (WDS).

Equipment available at other facilities include a Lakeshore vibrating scanning magnetometer and a scanning Auger spectrometer.

For additional information about the department's research facilities, please visit the following webpage: Materials Science and Engineering Research (http://www.mse.umd.edu/research/).

Materials Science and Engineering, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

The M.S. degree program offers thesis and non-thesis options. The thesis option requires 24 credit hours of course work plus a thesis. The non-thesis option requires 30 credit hours of course work and a scholarly research paper. All students must complete the Program Core requirements as well as all Graduate School requirements. The University of Maryland's Office of Advanced Engineering Education also offers a Professional Master of Engineering (M.E.) degree with a materials science and engineering option which requires 30 credits of graduate coursework and does not require a thesis.

Course	Title	Credits
ENMA650	Nanometer Structure of Materials	3
ENMA660	Thermodynamics in Materials Science	3
ENMA661	Kinetics of Reactions in Materials	3
ENMA671	Defects in Materials	3
or ENMA620	Polymer Physics	
ENMA688	Seminar in Materials Science and Engineering	3
Thesis or Non-Thesis Requirements		
Select one of the following:		15
Thesis:		
ENMA799	Master's Thesis Research	
Advanced graduate courses		
Non-Thesis:		
ENMA797	Independent Study (Complete a scholarly paper)	
Advanced graduate courses		
Total Credits		**30**

Materials Science and Engineering, Doctor of Philosophy (Ph.D.)

Students wishing to pursue a Ph.D. must complete 45 credits of core and specialized coursework and a dissertation based on original research. After the completion of the second semester of coursework, the student will take the Ph.D. qualifying examination.

Advance to Candidacy: Students must complete the four core courses listed below with a minimum of 2 grades of A- or higher and 2 grades of B- or higher. In addition, students must successfully complete a qualifying exam.

Post-Candidacy: Students must complete at least 18 credits of ENMA899 Doctoral Dissertation Research as well as defend and submit an original dissertation.

Course	Title	Credits
Required courses:		
ENMA650	Nanometer Structure of Materials	3
ENMA660	Thermodynamics in Materials Science	3
ENMA661	Kinetics of Reactions in Materials	3
ENMA671	Defects in Materials	3
or ENMA620	Polymer Physics	
ENMA688	Seminar in Materials Science and Engineering	3
Remainder of coursework		12
Dissertation Research Requirements		
ENMA899	Doctoral Dissertation Research	18
Total Credits		**45**

Materials Science and Engineering (PMMS)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Materials Science and engineering degree programs empower students to solve important scientific and technical problems through advancements in the underlying materials systems. Multidisciplinary courses and access to advanced laboratories also position graduates to become leaders in the field.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive

University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENMA (https://umd-curr.courseleaf.com/graduate/courses/enma/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Materials Science and Engineering, Master of Engineering (M.Eng.) (p. 284)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Materials Science and Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		
ENMA650	Nanometer Structure of Materials	3
ENMA660	Thermodynamics in Materials Science	3
ENMA661	Kinetics of Reactions in Materials	3
Electives approved by advisor		21
Total Credits		**30**

Materials Science and Engineering (Z060)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Materials Science and engineering degree programs empower students to solve important scientific and technical problems through advancements in the underlying materials systems. Multidisciplinary courses and access to advanced laboratories also position graduates to become leaders in the field.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENMA (https://umd-curr.courseleaf.com/graduate/courses/enma/)

Admissions
General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Materials Science and Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 285)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Materials Science and Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		
ENMA461	Thermodynamics of Materials	3
ENMA650	Nanometer Structure of Materials	3
ENMA661	Kinetics of Reactions in Materials	3
One additional course approved by advisor		3
Total Credits		**12**

Maternal and Child Health (MCHS)

Graduate Degree Program
College: Public Health

Abstract

Maternal and Child Health is an interdisciplinary field in which empirical research, epidemiological data, and policy analyses are used to understand individual, family, community, and sociocultural factors that influence health behaviors, health outcomes, and use of health services by mothers, children, adolescents, and their families (including fathers). The MCH doctoral program prepares students to advance research, policy, and practice to improve the health, safety, and well-being of these groups, with a particular emphasis on low income and ethnic minority populations. The program equips students to address MCH issues at both the family and population levels. It is unique in its focus on the whole family system and family health policy.

Ph.D. graduates in MCH are prepared for academic and research positions in colleges and universities; high level administrative or research positions in city/county/state/national health and human service agencies; and leadership positions in nongovernmental and advocacy organizations. MCH graduates are also increasingly hired by private healthcare organizations such as hospitals, HMOs, and health insurers.

The Department of Family Science prepares students to describe, explain, and improve the quality of family life through applied research, education, therapy, human services, policy analysis, and advocacy. The approach is interdisciplinary, emphasizing individual, interpersonal, and social change. The program of study is based on a systems or ecological paradigm, combining the perspectives of interrelated professional fields of maternal and child health, family science, couple and family therapy, family policy, behavioral science, and human services. Graduates are prepared for careers in the public, non-profit and private sectors, including university teaching, research, family policy analysis, and administrative positions in human service and public health programs.

Financial Assistance

Fellowships and Graduate Assistantships are available to students admitted into the Ph.D. program in MCH

Contact

Maternal and Child Health Ph.D. Program
Department of Family Science
1142 School of Public Health Building

4200 Valley Drive
University of Maryland
College Park, MD 20742
Phone: 301.405.3672
Fax: 301.314.9161
Email: fmsc@umd.edu

Website: http://www.sph.umd.edu
Relationships: Family Science (FMSC) (p. 199)
Courses: FMSC (https://umd-curr.courseleaf.com/graduate/courses/fmsc/)

Admissions

The Ph.D. in Maternal and Child Health program has a two-step application process. Applicants first submit the SOPHAS application (www.sophas.org (https://sophas.org/)), the centralized application service for schools and programs of public health (Step 1). Once the SOPHAS application has been verified applicants will submit their UMD Supplemental application (Step 2). Applicants will receive an email from the SPH Admissions team with instructions for how to complete the UMD Supplemental Application. Applications will not be reviewed until both the SOPHAS and UMD Supplemental applications are completed.

GENERAL ADMISSION REQUIREMENTS

- A master's degree in relevant field
- Minimum 3.0 undergraduate GPA
- Transcripts from all previous coursework
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose and objectives including career and educational goals, professional experience, and research areas of interest

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS application (Step 1) & UMD Supplemental application (Step 2)
- Three letters of recommendation
- Resume or curriculum vitae
- A writing sample is required.
- Fit between applicant's goals, expectations and research interests and program competencies and faculty expertise
- Please **do not** submit a GRE test score. The GRE requirement is waived for Fall 2022 admissions.

For detailed instructions on how to submit your application, please visit the School of Public Health Website: (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/))

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	SOPHAS - 3 Dec
	Supplemental - 7 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	SOPHAS - 3 Dec
	Supplemental - 7 Jan

RESOURCES AND LINKS

Program website: https://sph.umd.edu/academics/doctoral-degrees/phd-family-science (https://sph.umd.edu/academics/doctoral-degrees/phd-family-science/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Maternal and Child Health, Doctor of Philosophy (Ph.D.) (p. 286)

Facilities and Special Resources

Center for Healthy Families: This Center is the training and research arm of the Couple and Family Therapy Program in the Department of Family Science. Departmental graduate students and faculty provide clinical and educational services to families from surrounding communities in this state-of-the-art facility. Master's and doctoral students use data collected at the Center for research projects.

The University's close proximity to the nation's capital, the state capital in Annapolis, federal executive departments, and headquarters of national professional and public interest associations provide research and internship placements for studying family policy unmatched by any other graduate program in the discipline. The Washington-Baltimore metropolitan area offers rich opportunities for research on culturally and socioeconomically diverse families. The campus and department have excellent computer facilities. Students have ready access to the University's extensive library systems, as well as holdings from the Library of Congress, the National Institutes of Health, National Library of Medicine, National Archives, and many other library collections.

Maternal and Child Health, Doctor of Philosophy (Ph.D.)

The Maternal and Child Health Ph.D. program requires 51 graduate credit hours beyond the master's degree, including a maternal and child health core (24 credits), a research methods core (15 credits), and the dissertation (12 credits).

This program provides interdisciplinary training in research, practice, and policy relevant to health problems and services for women, infants, children, adolescents, and their families (including men). The MCH program prepares students to advance research, policy and practice to improve the health, safety, and well-being of these groups, with a particular emphasis on low income and ethnic minority populations. Students admitted full-time to the Ph.D. program post-master's can complete this program within three years.

Advance to Candidacy: Students in the PhD program advance to candidacy after completing required coursework and passing a written qualifying examination.

Post-candidacy: After advancement to candidacy, students must complete a dissertation proposal and oral defense, followed by doctoral dissertation and oral dissertation defense. In addition, students should complete at least 12 credits of FMSC899 Doctoral Dissertation Research.

Course	Title	Credits
Required courses:		
FMSC606	Ethnic Families and Health Disparities	3
FMSC660	Program Planning and Evaluation in Family Science	3
FMSC689	Research Internship	3
FMSC710	Maternal and Child Health from a Life Course Perspective	3
FMSC720	Study Design in Maternal Child Health Epidemiology	3
FMSC730	Key Topics in Maternal and Child Health	3
FMSC750	Family and Health Policy	3
FMSC780	Qualitative Methods in Family and Health Research	3
FMSC850	Maternal & Child Health Epidemiology	3
EPIB650	Biostatistics I	3
EPIB651	Applied Regression Analysis	3
Electives approved by Graduate Director		6
Dissertation Research Requirements		
FMSC899	Doctoral Dissertation Research	12
Total Credits		**51**

Mathematical Statistics (STAT)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The Statistics Program offers the Master of Arts and Doctor of Philosophy degrees for graduate study and research in statistics and probability. Areas of faculty research activity include high dimensional data, statistical decision and estimation theory, biostatistics, stochastic modeling, robust and nonparametric inference, semiparametric inference, categorical data analysis, theory and inference for stochastic processes, stochastic analysis, time series and spatial statistics. Students may concentrate in applied or theoretical statistics by selecting an appropriate sequence of courses and a research area to form an individual plan of study. The Program has been designed with sufficient flexibility to accommodate the student's background and interests. The Program also offers students from other disciplines an opportunity to select a variety of statistics courses to supplement their own study.

Biostatistics/Bioinformatics Specialization:

Biostatistics/Bioinformatics is an important research field in Statistics with immensely broad applications in public health, medical, and biological research. Bioinformatics is an emerging field with rapid development and has significant overlap with Biostatistics. The Bioinformatics/Biostatistics (STAT-BB) concentration addresses the increasing research opportunities and the educational needs of this burgeoning field. See (https://stat.umd.edu/grad-new/stat-bb.html)https://stat.umd.edu/grad-new/stat-bb.html (https://stat.umd.edu/stat-graduate/stat-bb.html)for details.

The Program is administratively affiliated with the Department of Mathematics, which maintains the records of all students in the Mathematical Statistics Program and handles correspondence with those applying for admission. However, any application for admission must indicate clearly that the student wishes to enter the Statistics (STAT) Program.

Employment prospects for statisticians are very good. All recent M.A. and Ph.D. graduates of Maryland's Statistics Program have found jobs in academia, industry and government agencies.

Financial Assistance

Graduate assistantships are awarded to Ph. D. students in the Statistics Program through the Mathematics Department. At present, the teaching load is six hours each semester, in addition to the duties of meeting with students and grading papers. There are approximately 20 graduate students in statistics with financial support. These are mostly teaching assistantships, but there are also a few research assistantships and fellowships. From time to time advanced students are placed into research assistantships as data analysts or statistical consultants with other campus units. Applications for financial aid are only processed once a year, for admission for the fall semester.

Contact

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Website: http://stat.umd.edu

Courses: STAT **(**https://umd-curr.courseleaf.com/graduate/courses/stat/**)**

Relationships: Applied Mathematics & Statistics, and Scientific Computation (AMSC) **(**p. 49**)**

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/)): TOEFL/IELTS required even if eligible for waiver.

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- GRE Subject (Math): GRE Math Subject is highly recommended

- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmathandstat.pdf)

M.A applicants can apply for spring or fall admission. Ph.D. applicants may only apply for the fall term. Spring admission does not offer financial support of any kind. If applicants have any questions, they should contact the department prior to submitting their application.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	12 Jan	8 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	12 Jan	15 Sep

Other Deadlines: Please visit the program website at http://stat.umd.edu

Requirements

- Mathematical Statistics, Doctor of Philosophy (Ph.D.) (p. 288)
- Mathematical Statistics, Master of Arts (M.A.) (p. 288)

Facilities and Special Resources

The STAT Program cooperates closely with the Mathematics Department and the Applied Mathematics, Statistics and Scientific Computation (AMSC) Program. The Program's faculty are actively involved in research in applied and theoretical areas of statistics and maintain close ties with applied scientists in several federal agencies.

The Program sponsors weekly seminars in Statistics and in Probability. In addition, Research Interaction Teams (RIT's) cover topics of current statistical interest.

Computing is integrated into the applied courses, and the Program also offers a course "Computational Methods in Statistics"

By scheduling many of its applied and Master's level courses in late-afternoon time slots, the Program facilitates and invites part-time graduate study.

Mathematical Statistics, Master of Arts (M.A.)

Total credits required: 30 credits

For the M.A. degree program, a student must complete 30 credit hours with at least a 3.0 average GPA; at least 18 of these credits must be at the graduate level (600/700 level) and at least 15 of the graduate credits must be in statistics and probability (STAT). The student must also submit a satisfactory scholarly paper.

There is no foreign language requirement for MA students. Applicants should keep in mind that no financial aid is offered to MA students.

Course	Title	Credits
Core Requirements		
Select 30 credits of coursework [1]		30
Write a scholarly paper		
Total Credits		**30**

[1] At least 18 credits at the 600-700 level and at least 15 credits at the 600-700 level in statistics and probability.

Mathematical Statistics, Doctor of Philosophy (Ph.D.)

The M.A. degree is not required for admission to the Ph.D. program. A doctoral student must complete a minimum of 36 hours of formal courses (at least 27 at the 600/700 level) with an average of B or better; at least 18 of the graduate credits must be taken in Statistics. In addition, the university requires at least 12 hours of STAT899 (Doctoral Research).

Advance to Candidacy: In addition to completing the course requirements below, students must pass all 3 qualifying exams in statistics: Applied Statistics, Statistics, and Probability. Or, pass any 2 of the 3 qualifying exams: Applied Statistics, Statistics or Probability, and complete a course sequence of the exam you choose not to take, or complete two additional courses from an approved list. The qualifying requirements may be satisfied by passing three written exams or by satisfactory performance in a specified list of courses. These examinations are given by the Mathematics Department twice a year in January and August. A student may take one or more examinations at a time. The student must pass two examinations by January of his or her third year in the graduate program, and must complete the qualifying requirements by the end of the fourth year. Most full-time students complete the qualifying requirements by the end of the second year or middle of the third year.

If successful in the qualifying requirements, the student must pass an oral examination. Administered by the Statistics faculty, the oral examination usually takes place a year after the student passes the written examination. This examination serves as a test of the student's in-depth preparation in the area of specialization and the student's research potential. Successful completion of the oral exam indicates that the student is ready to begin writing the doctoral dissertation.

Post-Candidacy: Complete at least 12 credits of STAT899 Doctoral Dissertation Research and successfully defend a dissertation.

Course	Title	Credits
Core Requirements		
Select 36 credits of coursework [1]		36
Pass the written examination in three fields at the Ph.D. level, including probability and one statistics area		
Pass the final oral examination		
Dissertation Research Requirement		
STAT899	Doctoral Dissertation Research	12
Total Credits		**48**

[1] At least 27 credits at the 600-700 level and at least 18 credits at the 600-700 level in statistics and probability.

Mathematics of Advanced Industrial Technology (MAIT)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

This program is not accepting new students at this time. Please visit our graduate program listing (p. 19) for other related programs.

Abstract

The Norbert Wiener Center, a research and educational unit in the Department of Mathematics at the University of Maryland, College Park, offers a professional Masters degree focusing on the modern mathematical methods and algorithms that underlie today's cutting-edge engineering: The Mathematics of Advanced Industrial Technology (MAIT).

Our program is designed for individuals working in mathematical engineering who are looking for a fast track to understanding and applying the most up-to-date ideas in their current and future projects. Undergraduate degree holders can advance to the Masters level, and Masters degree holders can advance their applicable skills.

In addition to the professional Masters degree, we also offer two certificate programs. For students wishing to enhance their career skills in specific subject matter, the Center also offers a Graduate Certificate in Mathematics of Advanced Industrial Technology to students completing 4 courses (12 credits) within the program. The Norbert Wiener Center also offers a specific Graduate Certificate concentration in Computational Harmonic Analysis. This 12-credit program is tailored to working engineers and scientists wishing to advance their understanding of the latest Fourier, Wavelet, and Time-Frequency Harmonic Analysis methods and algorithms.

Fields including RF and Optical Communications, Signal and Image Processing, Sensor Networks, RADAR and SONAR, Navigations and Avionics, Medical Imaging and Diagnostics, Control Systems, and Robotics, increasingly rely on fast, embedded mathematical algorithms executing on the latest microprocessors, micro-controllers, and DSP cores. Budding fields such as Bioinformatics, Nanotechnology, Data Mining, and Quantum Computing are likewise being built from the ground up around modern mathematical methods. Engineers and scientists that understand advanced mathematical toolsets will have the edge in creating tomorrow's technologies.

The Norbert Wiener Center's educational mission is to teach the mathematics of modern engineering in an accessible and applicable manner. Our faculty is drawn from both academia and industry in order to balance theoretical and "hands on" approaches in the most constructive way. Our courses offer the latest information while tying modern theory directly to application by incorporating industry standard tools. Graduates of the Norbert Wiener Center will be well equipped to apply the latest mathematical tools to advance both their projects and their careers.

The most up-to-date information about the MAIT program can be found on our website at www.mait.umd.edu (http://www.mait.umd.edu)

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Website: http://www.norbertwiener.umd.edu

Admissions

This program is not accepting new students at this time. Please visit our graduate program listing (p. 19) for information on other programs.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.norbertwiener.umd.edu

Requirements

- Mathematics of Advanced Industrial Technology, Master of Mathematics of Advanced Industrial Technology (M.M.A.I.T.) (p. 289)

Facilities and Special Resources

Courses for the MAIT program will be taught in the evening at the College Park Campus and also at sites in northern Virginia. The MAIT program is administered by the Norbert Wiener Center for Harmonic Analysis and Applications which is located within the Mathematics department on the second floor of the Mathematics building on Campus Drive in College Park

Mathematics of Advanced Industrial Technology, Master of Mathematics of Advanced Industrial Technology (M.M.A.I.T.)

This program is not accepting new students at this time. Please visit our graduate program listing (https://umd-curr.courseleaf.com/graduate/programs/) for other related programs.

Mathematics of Advanced Industrial Technology (Z022)

Graduate Certificate Program

College: Computer, Mathematical, and Natural Sciences

This certificate is not accepting new students at this time. Please visit our graduate program listing (p. 19) to view other certificates.

Website: http://www.norbertwiener.umd.edu

Admissions
Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.norbertwiener.umd.edu

Requirements

- Mathematics of Advanced Industrial Technology, Post-Baccalaureate Certificate (P.B.C.) (p. 290)

Mathematics of Advanced Industrial Technology, Post-Baccalaureate Certificate (P.B.C.)

For students wishing to enhance their career skills in specific subject matter, the Center also offers a Graduate Certificate in Mathematics of Advanced Industrial Technology to students completing 4 courses (12 credits) within the program. Coursework will include at least 2 of the core subjects and 2 listed electives to be completed with a GPA of 3.0 or higher.

Mathematics (MATH)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

Three programs are currently closely affiliated with the Mathematics Department: the Mathematics Program (MATH), the Applied Mathematics & Statistics, and Scientific Computation Program (AMSC), and the Mathematical Statistics Program (STAT). Students applying for admission should use the appropriate symbol to indicate their program of interest. The interdisciplinary Applied Mathematics & Statistics, and Scientific Computation Program offers three concentrations, one in Applied Mathematics, one in Scientific Computation, and one in Applied Statistics. The Statistics Program is concerned with mathematical statistics and probability. The AMSC and STAT programs are described in detail elsewhere in this catalog.

Students can earn a Doctor of Philosophy degree in the Mathematics Program. **The Master's degree is not offered** unless it is en route to a Ph.D. The master's degree is not required for entrance to the Ph.D. program.

The Mathematics Program offers graduate programs in Algebra and Algebraic Geometry, Complex Analysis, Dynamical Systems and Chaos, Geometry, Harmonic Analysis, Mathematical Logic, Number Theory, Numerical Analysis, Ordinary Differential Equations, Partial Differential Equations, Probability, Real and Functional Analysis, Representation Theory, Statistics and Topology.

Financial Assistance

The MATH program is expecting to support about 12 new doctoral students each Fall. Offers of support are generally made for up to five years, contingent on the student making satisfactory academic progress. Except for unusual circumstances, offers of financial aid will not be made to applicants seeking a Master's degree. The normal teaching load is four to six hours per week of classroom teaching in addition to the duties of meeting with students and grading papers. Sometimes fellowships and research assistantships are also available.

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Courses: MATH (p. 900)

Relationships: Applied Mathematics & Statistics, and Scientific Computation (AMSC) (p. 49) Mathematical Statistics (STAT) (p. 287)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/)): TOEFL/IELTS required even if eligible for waiver.

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- GRE Subject (Math) (Optional)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmathandstat.pdf)
- Publications/Presentations
- Advanced Textbooks (section of application)

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Dec
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	15 Dec

Other Deadlines: Please visit the program website at http://www-math.umd.edu

Requirements

- Mathematics, Doctor of Philosophy (Ph.D.) (p. 291)
- Mathematics, Master of Arts (M.A.) (p. 291)

Facilities and Special Resources

The Department is actively involved in research in a number of areas, strengthened further by a complement of mathematicians from the Institute for Physical Science and Technology. The Department fosters a lively program of seminars and colloquia; about half of these talks are given by outside specialists. In addition the department has a tradition of hosting distinguished long term visitors who give series of seminar talks or teach semester long courses.

The Engineering and Physical Sciences Library is located on the ground floor of the Mathematics Building and contains more than 95,000 volumes in mathematics, physics and engineering, and more than 280 journals in pure and applied mathematics. The Library of Congress, with its extensive collection of books and technical reports, is only a half hour from campus.

The Department has a large network of computers mostly running Linux. The Department houses a computer classroom and a Mathematical Visualization Lab, and similar labs are scattered across campus. There are computers in almost all graduate student offices, and many of the other computers on campus are available for student use.

The Department cooperates closely with the Institute for Physical Science and Technology and with the Department of Computer Science. Faculty members of both groups offer courses in the Department. Computer facilities are available to serve the research needs of both faculty and graduate students. Members of the Department participate actively in the interdisciplinary AMSC Program, and they also staff the Mathematical Statistics Program.

Mathematics, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

Please note: Students cannot apply to the M.A. degree. The M.A. can only be awarded on route to the Ph.D. All students interested in earning the M.A. must be doctoral students.

The M.A. degree program offers both a thesis and non-thesis option; most students choose the latter. The non-thesis option requires students to take 30 credit hours with an average of at least a B. At least 18 credits must be at the 600/700 level, including at least 12 hours in mathematics. Also, students must complete two full-year sequences at the 600/700 level, except that a suitable "Selected Topics" course may be substituted for the second part of one of these full-year courses. Additionally, students must pass Departmental written examinations in two different mathematical fields at the Master's level, and write a scholarly paper.

The thesis option requires a total of 24 hours of courses carrying graduate credit of which at least 15 are at the 600/700 level. Of these 15 hours at least 12 must be in mathematics. Of these 12 hours, at least 3 hours must be in each of two fields of mathematics distinct from the one in which the thesis is written, and must be passed with a grade of B or better. The student must also take 6 hours of thesis research, write a satisfactory thesis, and pass a final oral examination.

The M.A. degree includes no foreign language requirement. Generally it takes two to three years to earn the M.A., and approximately 20 degrees are granted each year in mathematics (MATH, STAT, and AMSC combined).

The department also has a 5-year program to earn a combined M.A./B.S. degree. The requirements for this program include the requirements for both the B.S. degree and the M.A. degree, with 9 hours of overlapping credits. Either the thesis or non-thesis option for the M.A. degree is available in this program.

Thesis Option

Course	Title	Credits
Core Requirements		
Select 24 credits of coursework [1]		24
MATH799	Master's Thesis Research	6
Pass a final oral examination		
Total Credits		**30**

1. At least 15 credits at the 600-700 level and at least 12 credits at the 600-700 level in mathematics.

Non-Thesis Option

Course	Title	Credits
Core Requirements		
Select 30 credits of coursework [1]		30
Pass two written exams at the Master's level		
Complete the correspending coursework		
Write a scholarly paper		
Pass a final oral examination		
Total Credits		**30**

1. At least 18 credits at the 600-700 level and at least 12 credits at the 600-700 level in mathematics

Mathematics, Doctor of Philosophy (Ph.D.)

The Ph.D. program does not require an M.A. degree, but applicants who are accepted should show, on the basis of their undergraduate record and recommendations, that they possess not only marked promise in

mathematical activities but the potential to perform on a creative level. Like the M.A. program, admission may be granted on a provisional basis.

Advance to Candidacy: In addition to completing the course requirements below, students must pass two qualifying exams, and in addition must take and pass four semesters of courses from a specific list with a grade of B or better, and an overall grade point average of at least 3.3 in these four courses. These four courses must be distinct from the ones supporting the qualifying exams and constitute the third and final qualifying exam requirement. The two qualifying exams and four additional courses, must be passed/completed by January of the student's third year in the graduate program. A student may alternatively take and pass a third (and possibly, a fourth) qualifying exam in place of two (or four) qualifying courses. If successful in these written examinations and courses, students must do advanced reading and coursework in their special area of interest before they can be admitted to candidacy and begin dissertation research.

The purpose of the written qualifying exams is to indicate that the student has the basic knowledge and mathematical ability to begin advanced study. Passing the exams is thus supposed to certify understanding of (selected) first-year graduate material. These examinations are given twice a year, in January and August. A student may take one or more examinations at a time.

Before advancing to candidacy, students must also obtain the consent of a faculty member who will accept the responsibility of directing a dissertation.

Post-Candidacy: Complete at least 12 credits of MATH899 Doctoral Dissertation Research and successfully defend a dissertation. The dissertation must represent an original contribution to mathematical knowledge and is usually published in a mathematical journal.

Course	Title	Credits
Core Requirements		
Select 36 credits of coursework [1]		30
Pass the written examination requirements		
Pass a final oral examination		
Dissertation Research Requirements		
MATH899	Doctoral Dissertation Research	12
Total Credits		**42**

[1] At least 27 credits at the 600-700 level and at least 18 credits in the Department of Mathematics.

Measurement, Statistics and Evaluation (EDMS)

Graduate Degree Program
College: Education

Abstract

Measurement, Statistics and Evaluation offers graduate study leading to the Master of Science or Doctor of Philosophy degrees for students with strong interests in research methods and their applications. Students pursuing Doctoral degrees in other programs may enroll in a dual degree program leading to the Master's degree in Measurement, Statistics and Evaluation, or there is also a 21-credit certificate program for doctoral students. For select undergraduates, there is a five-year Bachelor's/Master's program in Measurement, Statistics and Evaluation. Please note that for those PhD applicants who are hoping to receive a funding offer, you should adhere to the **preferred deadlines** on the program website and not the deadlines listed below.

Financial Assistance

Graduate teaching assistantships, research assistantships, and fellowships are available. The Department can usually aid students in locating part-time employment opportunities, both on and off campus, as well as providing funding from its own contracts and grants.

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Website: http://www.education.umd.edu/Academics/Departments/HDQM/academic/degreePrograms/mseval.html

Courses: EDMS **(**p. 730**)**. (p. 730)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample

In addition to Graduate School requirements, admission decisions are based on the quality of previous undergraduate and graduate work, strength of letters of recommendation from persons competent to judge the applicant's likelihood of success in graduate school, scores on the Graduate Record Examination, and the applicant's statement of academic and career objectives in relation to the program of study to be pursued. Students who seek admission should display strong evidence of aptitude and interest in quantitative methods. Programs of study may be designed to meet the individual needs of both full-time and part-time students since many courses are offered in the late afternoon or evening.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	November 5, 2021	November 5, 2021

International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	October 1, 2021	September 30, 2021

RESOURCES AND LINKS:
Program Website: http://www.education.umd.edu/HDQM/
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Measurement, Statistics and Evaluation, Certificate of Advanced Study (C.A.S.) (p. 293)
- Measurement, Statistics and Evaluation, Doctor of Philosophy (Ph.D.) (p. 293)
- Measurement, Statistics and Evaluation, Master of Education (M.Ed.) (p. 293)
- Measurement, Statistics and Evaluation, Master of Science (M.S.) (p. 293)

Facilities and Special Resources

The Department maintains computer equipment and high performance server with up-to-date statistical software packages. The faculty are actively engaged in a large variety of basic and applied research projects and students are encouraged to become involved in these activities. The Washington and Baltimore areas have numerous organizations that provide opportunities to become involved in projects that have national importance.

Measurement, Statistics and Evaluation, Certificate of Advanced Study (C.A.S.)

The Certificate in Measurement, Statistics and Evaluation (p. 294) is designed to provide advanced training in quantitative methods for graduate students majoring in other doctoral programs. The certificate requires a minimum of 21 graduate credit hours. In addition, an advisor must be selected from members of the Measurement, Statistics and Evaluation faculty.

Measurement, Statistics and Evaluation, Master of Science (M.S.)

Thesis or Non-thesis option: 30 credits required

The Measurement, Statistics and Evaluation M.S. degree program requires a minimum of 30 credit hours. Both thesis and non-thesis options are available. A written comprehensive examination is required for both options and a research paper is required for the non-thesis option.

Course	Title	Credits
Required courses:		
EDMS623	Applied Measurement: Issues and Practices	3
EDMS646	General Linear Models I	3
EDMS647	Causal Inference and Evaluation Methods	3
EDMS651	General Linear Models II	3
EDMS655	Introduction to Multilevel Modeling	3
EDMS657	Exploratory Latent and Composite Variable Methods	3
EDMS724	Modern Measurement Theory	3
Thesis or Non-Thesis Requirements		
Select one of the following:		9
Thesis:		
EDMS799	Master's Thesis Research	
Elective		
Non-Thesis:		
Electives		
Total Credits		**30**

Measurement, Statistics and Evaluation, Master of Education (M.Ed.)

The M.Ed. option is not currently offered.

Measurement, Statistics and Evaluation, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 66 credits including 12 credits of EDMS899 and 21 credits of electives.

The Ph.D. program requires both preliminary and comprehensive examinations; the comprehensive examination is designed to assess broad, integrated understanding as well as the student's specialization. All students are expected to engage in research. Measurement, Statistics and Evaluation does not currently offer the Ed.D. degree.

Course	Title	Credits
Required courses:		
EDMS623	Applied Measurement: Issues and Practices	3
EDMS626	Instrumentation	3
EDMS646	General Linear Models I	3
EDMS647	Causal Inference and Evaluation Methods	3
EDMS651	General Linear Models II	3
EDMS655	Introduction to Multilevel Modeling	3
EDMS657	Exploratory Latent and Composite Variable Methods	3
EDMS722	Structural Modeling	3
EDMS724	Modern Measurement Theory	3
EDMS779	Seminar in Applied Statistics	3
EDMS787	Bayesian Inference and Analysis	3
Electives		21
Dissertation Research Requirements		
EDMS899	Doctoral Dissertation Research	12
Total Credits		**66**

Measurement, Statistics & Evaluation (Z019)

Graduate Certificate Program
College: Education

Abstract

The Certificate in Measurement, Statistics and Evaluation is a 21-credit certificate designed to provide advanced training in quantitative methods for doctoral students majoring in other programs.

Note: To enroll in this Certificate program you must currently be a doctoral student in a University of Maryland program other than EDMS

Contact

Jannitta Graham
Graduate Coordinator
Department of Human Development and Quantitative Methodology
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3942 Campus Drive
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College Park, MD 20742
Telephone: 301.405.8432
Email: jgraham7@umd.edu

Website: http://www.education.umd.edu/Academics/Departments/HDQM/academic/degreePrograms/mseval.html

Courses: EDMS (https://umd-curr.courseleaf.com/graduate/courses/edms/)

Admissions

To enroll in this Certificate program you must currently be a doctoral student in a University of Maryland program other than EDMS. Please contact Jannitta Graham (jgraham7@umd.edu) for admissions information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://www.education.umd.edu/Academics/Departments/HDQM/academic/degreePrograms/mseval.html

Requirements

- Measurement, Statistics & Evaluation, Post-Baccalaureate Certificate (P.B.C.) (p. 294)

Measurement, Statistics & Evaluation, Post-Baccalaureate Certificate (P.B.C.)

Total Credits: 21 credits required

The Certificate in Measurement, Statistics and Evaluation is designed to provide advanced training in quantitative methods for graduate students majoring in other doctoral programs. The certificate requires a minimum of 21 graduate credit hours. In addition, an advisor must be selected from members of the Measurement, Statistics and Evaluation faculty.

Course	Title	Credits
Required courses:		
EDMS623	Applied Measurement: Issues and Practices	3
EDMS646	General Linear Models I	3
EDMS647	Causal Inference and Evaluation Methods	3
EDMS651	General Linear Models II	3
Electives		9
Total Credits		**21**

Mechanical Engineering (ENME)

Graduate Degree Program
College: Engineering

Abstract

The Department of Mechanical Engineering offers graduate study leading to the Master of Science and Doctor of Philosophy degrees. In addition, students may pursue a Master of Engineering degree through the Professional Master's Program of the Office of Advanced Engineering Education. The Department's instruction and research are carried out through the following four divisions:

DESIGN and System Reliability

The focus of this area of concentration is the study of:

- Measuring, tracking, and predicting levels of reliability during systems' life cycles
- Understanding and mitigating the causes of component, system, and process failures
- Incorporating reliability, sustainment, and life-cycle considerations into design
- Microelectronic device and electronic system reliability and stress analysis
- Integrated product design and manufacturing
- Design and reliability of high temperature and high power electronic systems, electro-optics, sensors, and actuators
- Battery design, thermal management, and reliability
- Design formalisms
- Multi-criteria design decision making and optimization
- Statistical process control and improved manufacturing methods
- Human reliability analysis
- Cybersecurity
- Machine learning and data analytics

Mechanics, Materials, and manufacturing

This division concentrates on the study of analytical and experimental fundamentals of mechanics and materials. Areas of specialization include:

- Control systems in product development organization
- Dynamic deformation and fracture studies, including fracture and fragmentation by explosives
- Fiber optics
- Smart structures
- Vibration and acoustic control
- Vibro-acoustic heating and phonon transport
- Non-linear dynamics of milling of thin walled structures
- Control of crane-load oscillations
- Surgical robotics
- Development of creep-fatigue damage models for viscoplastic materials such as solder
- Micromechanics of advanced composite materials
- Characterization and optimization of mechanical properties of materials
- Methods for non-destructive detection of damage in structural systems
- Mechanical characterization of Micro-Electro-Mechanical Systems (MEMS) materials
- Manufacturing systems
- Additive manufacturing in micro-nano-bio systems

Thermal, Fluids, and Energy Sciences

This division encompasses two broad disciplines: thermal science and fluid mechanics. Areas of specialization include:

- Application of three-dimensional vortex methods to turbulent flow prediction
- Experimental, numerical, and theoretical analysis of scalar pollutant dispersion in turbulent boundary layers
- Experimental studies of the near surface atmospheric boundary layer
- Large-eddy and direct numerical simulation of 3-D and non-equilibrium boundary layers
- Experimental measurement and analysis of particle/turbulence interaction within turbulent, multi-phase flows
- Fundamental research into pool and flow boiling heat transfer
- Experimental investigation of steady and unsteady breaking waves
- Fouling and particulate deposition on low temperature surfaces
- Performance of water foaming agents in fire protection applications
- Mixing of boron diluted water slugs and nuclear reactor reactivity excursions
- Thermal management and characterization of electronic equipment
- Transport phenomena in manufacturing
- Study of absorption heat pumps and chillers
- Heat transfer enhancement of environmentally safe refrigerants
- Investigation of performance potential for natural refrigerant
- Simulation, analysis, and experimentation in heat pump and refrigeration systems
- Annular and post-annular flow in microchannels
- Two-phase thermofluid enhancement through flow regime modification
- Monolithic and thin-film thermoelectric microcoolers.

Financial Assistance

Financial assistance is available to highly qualified students in the form of research and teaching assistantships. The most outstanding applicants are offered fellowships. Students seeking financial assistance should submit with their applications a current resume or CV as well as a statement regarding their qualifications and/or past research or teaching experience. Financial assistance is sought for all worthy students.

Contact

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Telephone: 301.405.4216
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Email: mpetry@umd.edu

Website: http://www.enme.umd.edu

Courses: ENME (https://umd-curr.courseleaf.com/graduate/courses/enme/) ENRE (https://umd-curr.courseleaf.com/graduate/courses/enre/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations

The programs leading to the M.S. and Ph.D. degrees are open to qualified students holding a bachelor's degree in mechanical engineering. Admission may also be granted to students with degrees from other areas of engineering, mathematics, and physical sciences. In some cases, students may be required to take undergraduate courses to fill gaps in their background.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	May 13, 2022	October 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	March 11, 2022	September 24, 2021

RESOURCES AND LINKS:
Program Website: http://www.enme.umd.edu
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Mechanical Engineering, Doctor of Philosophy (Ph.D.) (p. 296)
- Mechanical Engineering, Master of Science (M.S.) (p. 296)

Facilities and Special Resources

Mechanical engineering faculty, researchers, and students leverage state-of-the-art research equipment, technology, and systems to develop new methods, create innovative tools, and find practical solutions to the most pressing societal concerns. More information about our research labs and centers can be found here: https://enme.umd.edu/facilities (https://enme.umd.edu/facilities/).

Mechanical Engineering, Master of Science (M.S.)

Thesis only: 30 credits

Students enrolled in the M.S. program in Mechanical Engineering must complete at least 30 credits for graduation. This includes 24 credits of approved coursework and 6 credits of M.S. Thesis Research. The M.S. Coursework Plan sets forth the courses required to be taken by the student in partial fulfillment of the M.S. degree requirements. The coursework plan must be prepared in consultation with a faculty advisor in the student's technical area of interest, and submitted to the Graduate Office (2168 Glenn L. Martin Hall) for approval by the Director of Graduate Studies at the beginning of the first semester of study. Changes to the plan are permitted, but must be approved by the student's advisor and the Director of Graduate Studies prior to their implementation. A new coursework plan reflecting the changes must be filed with the ME Graduate Office every time changes are made.

Course	Title	Credits
Core Requirements		
Complete 24 hours of approved coursework [1]		24
ENME799	Master's Thesis Research	6
Specialization Requirements		
Select one of the following:		
Design and Reliability of Systems		
Thermal-Fluid Sciences		
Mechaniccs and Materials		
Total Credits		**30**

[1] At least 15 credits from courses taken at the 600 level or above.

Mechanical Engineering, Doctor of Philosophy (Ph.D.)

Students in the Ph.D. program must take a minimum of 36 credits of approved graduate coursework beyond the B.S. degree (a minimum of 12 credits of coursework at the University of Maryland) and 12 credits of dissertation research. Students currently holding an M.S. from an approved engineering, math, or science program may apply up to 24 credits from their previous degree towards their doctoral coursework requirement.

Advance to Candidacy: In addition to the course requirements below, students must successfully pass a qualifying exam, as well as present a Dissertation Topic Proposal. The proposal should be completed within two semesters of passing the qualifying exam

Post-Candidacy: Complete at least 12 credits of ENME899 Doctoral Dissertation Research and successfully defend and submit a dissertation on an original research topic.

Course	Title	Credits
Core Requirements		
Select a minimum of 36 credits of coursework beyond the Bachelor's degree [1]		36
Dissertation Research Requirements		

ENME899	Doctoral Dissertation Research	12
Total Credits		**48**

[1] The coursework plan should contain a minimum of six credits of courses in mathematics.

Mechanical Engineering (PMME)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered by the Department of Mechanical Engineering, our Mechanical degree programs give students the tools needed to expand their understanding of the fundamentals in this growing field while introducing them to modern technologies. Courses are taught by leaders in robotic control, advanced vehicle technologies, energy systems, and more, and students have access to state-of-the-art research facilities. Students in this program choose from 1 of 2 tracks: General Mechanical or Energy and the Environment.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENME (https://umd-curr.courseleaf.com/graduate/courses/enme/) ENRE (https://umd-curr.courseleaf.com/graduate/courses/enre/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:
Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Mechanical Engineering, Master of Engineering (M.Eng.) (p. 297)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Mechanical Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Students choose one of the two focus areas and take five core courses and five electives from that area. Electives must be approved by their advisor.

Course	Title	Credits
Select five core courses and five electives from one of the following focus areas:		30
General Mechanical core course options:		
ENME600	Engineering Design Methods	
ENME605	Advanced Systems Control	
ENME607	Engineering Decision Making and Risk Management	
or ENRE671	Risk Assessment in Engineering	
ENME610	Engineering Optimization	
ENME631	Advanced Conduction and Radiation Heat Transfer	
ENME632	Advanced Convection Heat Transfer	
ENME640	Fundamentals of Fluid Mechanics	
ENME662	Linear Vibrations	
ENPM652	Applied Finite Element Methods	
ENPM654	Energy Systems Management	
ENPM671	Advanced Mechanics of Materials	
ENME690	Mechanical Fundamentals of Electronic Systems	
ENME712	Measurement, Instrumentation and Data Analysis for Thermo-Fluid Processes	
Energy and The Environment core course options:		
ENME647	Multiphase Flow and Heat Transfer	
ENPM621	Heat Pump and Refrigeration Systems Design Analysis	
ENPM622	Energy Conversion I - Stationary Power	
ENPM623	Engineering Combustion Emissions for Air Pollution Control	
ENPM624	Renewable Energy Applications	
ENPM625	Heating, Ventilation and Air Conditioning of Buildings	
ENPM626	Waste and Biomass Energy Conversion	
ENPM627	Environmental Risk Analysis	
ENPM635	Thermal Systems Design Analysis	
ENPM651	Heat Transfer for Modern Application	
ENPM654	Energy Systems Management	
ENPM656	Energy Conversion II -- Mobile Power	
ENME809A	Course ENME809A Not Found (Steady State and Dynamic Modeling of Energy Systems)	

Mechanical Engineering (Z061)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Offered by the Department of Mechanical Engineering, our Mechanical degree programs give students the tools needed to expand their understanding of the fundamentals in this growing field while introducing them to modern technologies. Courses are taught by leaders in robotic control, advanced vehicle technologies, energy systems, and more, and students have access to state-of-the-art research facilities. Students in this program choose from 1 of 2 tracks: General Mechanical or Energy and the Environment.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENME **(**https://umd-curr.courseleaf.com/graduate/courses/enme/**)** ENRE **(**https://umd-curr.courseleaf.com/graduate/courses/enre/**)**

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021

International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Mechanical Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 299)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus. In addition to in-person courses, you may have the option to take some course requirements in an online format. Course format offerings are subject to change.

Mechanical Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Select 4 courses in either the Energy & Environment or General Mechanical track:		12
Energy and The Environment:		
ENME647	Multiphase Flow and Heat Transfer	
ENPM621	Heat Pump and Refrigeration Systems Design Analysis	
ENPM622	Energy Conversion I - Stationary Power	
ENPM623	Engineering Combustion Emissions for Air Pollution Control	
ENPM625	Heating, Ventilation and Air Conditioning of Buildings	
ENPM626	Waste and Biomass Energy Conversion	
ENPM627	Environmental Risk Analysis	
ENPM651	Heat Transfer for Modern Application	
ENPM654	Energy Systems Management	
ENPM656	Energy Conversion II -- Mobile Power	
ENPM635	Thermal Systems Design Analysis	
OR		
ENME635	Energy Systems Analysis	
ENPM624	Renewable Energy Applications	
OR		
ENME701	Sustainable Energy Conversion and the Environment	
ENME809A	Course ENME809A Not Found (Steady State and Dynamic Modeling of Energy Systems)	
General Mechanical Engineering:		
ENME600	Engineering Design Methods	
ENME605	Advanced Systems Control	
ENME607	Engineering Decision Making and Risk Management	
ENME610	Engineering Optimization	
ENME631	Advanced Conduction and Radiation Heat Transfer	
ENME632	Advanced Convection Heat Transfer	
ENME640	Fundamentals of Fluid Mechanics	
ENME662	Linear Vibrations	
ENME690	Mechanical Fundamentals of Electronic Systems	
ENME712	Measurement, Instrumentation and Data Analysis for Thermo-Fluid Processes	
ENPM671	Advanced Mechanics of Materials	
ENPM654	Energy Systems Management	
ENPM652	Applied Finite Element Methods	
OR		
ENME674	Finite Element Methods	
Total Credits		**12**

Methods of Public Analysis (Z001)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Methods of Public Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 300)

Methods of Public Analysis, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Multimedia Journalism (Z071)

Graduate Certificate Program
College: Journalism

Abstract

The Graduate Certificate of Professional Studies in Multimedia Journalism teaches the skills most in demand today for communications professionals in news organizations, nonprofits and business. Multimedia Journalism blends practical training in digital storytelling with the critical application of editorial, ethical and legal principles.

Multimedia Journalism is designed for professional journalists and communicators to learn the skills and concepts needed for nonfiction storytelling across media platforms, including social and web. The program offers updated skills to professionals in a field in which technology is rapidly changing. Students learn to shoot and edit photos and video; create interactive, responsive web pages using html and css; report, write and upload stories from the field using mobile devices; and research and pitch ideas for new digital media businesses.

The 12-credit, four-course graduate certificate targets working professionals. Classes meet on Saturdays in the fall and spring semesters and may be taken one or two at a time.

If you are seeking a master's degree to provide you with the fundamentals of journalism for a professional career, please see the Journalism (JOMJ) (p. 261) degree. If you are an experienced journalist looking for a research-focused master's degree, go to Journalism (JOUR) (p. 263); If you're looking for a Ph.D. program, go to Journalism (JOST) (p. 262).

Contact

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University of Maryland
College Park, MD 20742
Telephone: 301.405.7762
Email: oes@umd.edu
Website: http://ter.ps/oesjour **(**http://ter.ps/oesjour/**)**

The Philip Merrill College of Journalism
Chris Harvey, Program Director
Serap Rada, Graduate Coordinator
Telephone: 301.405.2796
Email: charvey@umd.edu
Email: sdrada@umd.edu
Website: https://merrill.umd.edu/academics/multimedia-certificate/

Courses: JOUR (https://academiccatalog.umd.edu/graduate/courses/jour/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- CV/Resume

UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (ISSS). For additional requirements, please see: https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-certificate-multimedia-journalism/apply#International (https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-certificate-multimedia-journalism/apply/#International)

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Fall 2020: 28 July	1 Dec
	Fall 2021: 2 July	
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	2 Feb	18 Aug

Other Deadlines: Please visit the program website at http://ter.ps/oesjour (http://ter.ps/oesjour/)

Requirements

- Multimedia Journalism, Post-Baccalaureate Certificate (P.B.C.) (p. 300)

Multimedia Journalism, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
JOUR623	Mobile Journalism	3
JOUR455	Media Entrepreneurship	3
JOUR604	Introduction to Multimedia Skills for Graduate Certificate Programs	3

JOUR652	Interactive Design and Development	3
Total Credits		**12**

Museum Scholarship & Material Culture (Z016)

Graduate Certificate Program
College: Arts and Humanities

Abstract

This certificate only accepts students currently enrolled in a University of Maryland graduate program.

CONTACT

Ricardo L. Punzalan
University of Maryland
College Park, MD 20742
Telephone: 301.405.6518
Email: museumscholarship@umd.edu

Website: http://msmc.umd.edu/

Courses: ANTH (https://academiccatalog.umd.edu/graduate/courses/anth/) HIST (https://academiccatalog.umd.edu/graduate/courses/hist/)

Admissions

This certificate only accepts students currently enrolled in a University of Maryland graduate program. Please contact the department for admissions information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.history.umd.edu

Requirements

- Museum Scholarship & Material Culture, Post-Baccalaureate Certificate (P.B.C.) (p. 301)

Museum Scholarship & Material Culture, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Select one of the following:		3
AMST655	Introduction to Museum Scholarship	
ANTH655	Introduction to Museum Scholarship	
HIST610	Introduction to Museum Scholarship	
Select one of the following:		3
AMST856	Museum Research Seminar	
ANTH856	Museum Research Seminar	
HIST810	Museum Research Seminar	
Select one of the following:		3
AMST857	Museum Scholarship Practicum	
ANTH857	Museum Scholarship Practicum	
HIST811	Museum Scholarship Practicum	
Additional course approved by advisor		3
Total Credits		**12**

Music Education (MUED)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Music offers programs of study leading to the Master of Arts degree with areas of specialization in ethnomusicology, music history and literature (musicology), music education, and music theory; the Master of Music degree with areas in performance, composition, conducting, and music education; the Doctor of Philosophy degree with areas of specialization in ethnomusicology, musicology, music education, and music theory; and the Doctor of Musical Arts degree with areas of specialization in composition, performance, and conducting.

Financial Assistance

A number of competitive fellowships, graduate assistantships, teaching assistantships, opera assistantships, and orchestral assistantships are available. Preference for financial assistance will be given to those who have filed an application for admission to the University and the School of Music Supplemental Application by December 1 (for performance programs) and January 15 (for Music Education only) and have been officially admitted.

Contact

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2110 Clarice Smith Performing Arts Center
8115 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.5560
Fax: 301.314.9504
Email: musicadmissions@umd.edu

Website: http://www.music.umd.edu

Courses: MUED (https://academiccatalog.umd.edu/graduate/courses/mued/) MUSC (https://academiccatalog.umd.edu/graduate/courses/musc/) MUSP (https://academiccatalog.umd.edu/graduate/courses/musp/)

Admissions

General Requirements

- Statement of Purpose and Letters of Recommendation: The statement of purpose and three letters of recommendation will be required to be uploaded in the Supplementary Application (Acceptd), not the Graduate School's application.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample

Admission to the graduate degree programs in music is highly selective. It is determined primarily by a performance audition, tapes and scores of original compositions, scholarly research papers, letters of recommendation, and/or successful teaching experience; additionally, in some academic areas, the general GRE scores are considered.
All non-native English-speaking students must achieve a score of 575/233/100 on the TOEFL to be invited for audition/admission (see the School of Music's admission website (http://www.music.umd.edu/prospective_students/application_materials/#international) for detailed English language requirements).

We require a passing TOEFL score (minimum 100 IBT, 233 CBT, 575 PBT) for all applicants whose primary language is not English before we will process your application or consider you for a live audition. The requirement will be waived for applicants who have earned an undergraduate degree from an institution in the United States or another approved English-speaking country. Waivers will only be granted if at least three years of the undergraduate education or at least two years of the graduate education in a non-performance related field took place at an English-speaking institution. Graduate degrees in performance-related fields or performance certificates or diplomas will not exempt an applicant from submitting a passing TOEFL score.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 1, 2021

RESOURCES AND LINKS:

Program Website: http://www.music.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Music Education, Doctor of Philosophy (Ph.D.) (p. 303)
- Music Education, Master of Arts (M.A.) (p. 303)
- Music Education, Master of Music (M.Mus.) (p. 303)

Facilities and Special Resources

With approximately 300 public performances each year—including student recitals and more than thirty ensembles—School of Music students have robust performance opportunities The School of Music also hosts numerous guest clinicians each year and presents the Renegade Series, which brings to campus some of the most visionary artists in our field. As one of the nation's leading public research universities, the University of Maryland provides a wealth of opportunities to learn from and collaborate with scholars in a variety of disciplines. The School of Music makes its home in the Clarice Smith Performing Arts Center, which serves as an inter-disciplinary laboratory for the arts. The building's six performance halls, the Michelle Smith Performing Arts Library, specialized rehearsal rooms, and classrooms provide students with all the resources needed to become twenty-first century artist-citizens. The Clarice's presenting arm provides School of Music students with the opportunity to collaborate and learn from internationally recognized artists and scholars. Recent artists-in-residence have included the St. Lawrence String Quartet, the Cappella Pratensis, Etienne Charles, Tine Thing Helseth, Jeremy Denk, and Dawn Upshaw. The Michelle Smith Performing Arts Library (MSPAL) ranks among the top twenty university music libraries in the United States, and it offers a variety of archives, special collections, and other research resources that give it international stature among scholars in a broad spectrum of music disciplines. The total music collection includes approximately 50,000 books, 150,000 scores, 140,000 recordings, and 4,500 linear feet of archival materials. The International Piano Archives at Maryland (IPAM) is the only institutional collection in existence devoted to historic piano performance. IPAM contains 40,000 recordings, 8,500 music scores, 2,500 books, and a collection of reproducing pianos with 8,000 piano rolls. To date, IPAM has acquired the collections of more than 40 eminent pianists. The MSPAL Special Collections in Performing Arts embrace a growing number of national and international music organization archives representing music education, band history, solo and ensemble instrumental performance, music librarianship, and ethnomusicology. Materials in these archives include papers, music scores, recordings, books, magazines, photographs, and oral histories. MSPAL also features important archival and manuscript collections on music criticism and American music, the Charles Fowler Papers supporting the study of arts education, a significant Leopold Stokowski Collection, the Jacob Coopersmith Collection of Handeliana, the Radio Station WOR/Alfred Wallen stein Collection of 26,000 orchestral scores, and the performance parts of the Andre Kostelanetz Orchestra.

The surrounding DC-Baltimore region offers a host of community engagement opportunities. Our students can often be seen performing at major venues such as The John F. Kennedy Center for the Performing Arts, Strathmore Hall and the Phillips Collection. We also present at intimate community spaces such as Riversdale Mansion and the historical Greenbelt Theatre. Within a few miles of our home in College Park are research opportunities offered by Dumbarton Oaks, the Enoch Pratt Free Library of Baltimore, the Folger Shakespeare Library, the Library of Congress, the National Archives, the Smithsonian Institution, and many other specialized libraries.

Music Education, Master of Arts (M.A.)

Thesis only: 30 credits required

The Master of Arts Degree (Thesis Option in Ethnomusicology, Music Education, Music History and Literature [Musicology], or Music Theory; Non-Thesis Option in Ethnomusicology or Music History and Literature [Musicology]) requires a minimum of 30 credit hours (35 for Ethnomusicology), with a minimum of 12 credit hours in Major Studies, 9 credit hours in Studies in Areas Supporting the Major (14 for Ethnomusicology), and 9 credit hours in Other Studies in Music. In addition, a grade of B- or better is required in all courses used to fulfill requirements for the degree; a Thesis must be written (Ethnomusicology Non-Thesis Option requires two scholarly research papers), an oral defense of the Thesis (or research papers) must be passed; and a written comprehensive examination must be passed. Specific courses are required in each area of specialization.

Course	Title	Credits
Required courses:		
MUED690	Research Methods in Music and Music Education	3
MUED692	Foundations and Perspectives of Music Education	3
MUSC799	Master's Thesis Research	6
Studies in Areas Supporting the Major		9
Other Studies in Music		9
Total Credits		**30**

Music Education, Master of Music (M.Mus.)

Non-thesis only (scholarly paper required): 30 credits required

The Master of Music Degree (Non-Thesis Option in Composition, Conducting, Music Education, or Performance) requires a minimum of between 31 and 36 credit hours depending on the specific program. Required coursework is distributed among three areas of study: Major studies, Studies in Areas Supporting the Major, and Other Studies in Music. In addition, a grade of B- or better is required in all courses used to fulfill requirements for the degree; a scholarly research paper must be written as part of MUSC648 or MUED690; a Final Project must be completed satisfactorily; and an oral comprehensive examination of courses required in Major Studies and in Studies in Areas Supporting the Major must be passed. Specific courses are required in each area of specialization.

Course	Title	Credits
Required courses:		
MUED690	Research Methods in Music and Music Education	3
MUED692	Foundations and Perspectives of Music Education	3
Additional 600-level MUED course		6
MUSC699	Selected Topics in Music	1-2
Studies in Areas Supporting the Major		9
Academic Courses in Music		9
Total Credits		**31-32**

Music Education, Doctor of Philosophy (Ph.D.)

The Doctor of Philosophy degree requires the satisfactory completion of a significant body of coursework that, in the student's and Graduate Advisor's judgement, prepares the student for the preliminary examination that leads to admission to candidacy, as well as certain specific courses required in each area of specialization. The Ph.D. in Music Education requires a minimum of 48 credits beyond the master's degree, including 12 credits of doctoral dissertation research. . A grade of B- or better is required in all courses used to fulfill requirements for the degree. A Principal Advisor for the dissertation will be chosen by the student and the academic advisor; the Principal Advisor and the student will then nominate the remaining members of the dissertation committee. The dissertation must be successfully defended before the entire dissertation committee. The Doctor of Philosophy degree requires a Written Dissertation.

Advance to Candidacy: In addition to completing the course requirements below, students must complete a pre-candidacy portfolio. The portfolio should include a first year paper, second year paper, public lecture, and teaching demonstrations. Students must also pass a preliminary examination, successfully defend the dissertation prospectus, and obtain IRB approval in order to advance to candidacy.

Post-Candidacy: Complete at least 12 credits of MUSC899 doctoral dissertation research and successfully defend and submit an original dissertation.

Course	Title	Credits
Required courses:		
MUED780	Seminar in Music Teacher Education	3
MUED697	Curriculum & Assessment in Music Education	3
MUED790	Design and Analysis of Research in Music Education	3
MUED729	Doctoral Colloquium in Music Education	3
Additional 600-level MUED course		3
Music Academic Core		6
Quantitative Reasoning		3
Advanced Research Methods		6
Cognate Outside of Music		6
Dissertation Research Requirements		
MUED899	Course MUED899 Not Found	12
Total Credits		**48**

Music (MUSA)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Music offers programs of study leading to the Master of Arts degree with areas of specialization in ethnomusicology, music history and literature (musicology), music education, and music theory; the Master of Music degree with areas in performance, composition, conducting, and music education; the Doctor of Philosophy degree with areas of specialization in ethnomusicology, musicology, music education, and music theory; and the Doctor of Musical Arts degree with areas of specialization in composition, performance, and conducting.

Financial Assistance

A number of competitive fellowships, graduate assistantships, teaching assistantships, opera assistantships, and orchestral assistantships are available. Preference for financial assistance will be given to those who have filed an application for admission to the University and the School of Music Supplemental Application by December 1 (for performance programs) and January 15 (for Music Education only) and have been officially admitted.

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Admissions

General Requirements

- Statement of Purpose and Letters of Recommendation: The statement of purpose and three letters of recommendation will be required to be uploaded in the Supplementary Application (Acceptd), not the Graduate School's application.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Writing Sample
- Letters of Recommendation (3)

Admission to the graduate degree programs in music is highly selective. It is determined primarily by a performance audition, tapes and scores of original compositions, scholarly research papers, letters of recommendation, and/or successful teaching experience; additionally, in some academic areas, the general GRE scores are considered.
All non-native English-speaking students must achieve a score of 575/233/100 on the TOEFL to be invited for audition/admission (see the School of Music's admission website (http://www.music.umd.edu/prospective_students/application_materials/#international) for detailed English language requirements).

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APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	December 1, 2021

RESOURCES AND LINKS:
Program Website: http://www.music.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Music, Doctor of Philosophy (Ph.D.) (p. 305)
- Music, Master of Arts (M.A.) (p. 305)

Facilities and Special Resources

With approximately 300 public performances each year—including student recitals and more than thirty ensembles—School of Music students have robust performance opportunities The School of Music also hosts numerous guest clinicians each year and presents the Renegade Series, which brings to campus some of the most visionary artists in our field. As one of the nation's leading public research universities, the University of Maryland provides a wealth of opportunities to learn from and collaborate with scholars in a variety of disciplines. The School of Music makes its home in the Clarice Smith Performing Arts Center, which serves as an inter-disciplinary laboratory for the arts. The building's six performance halls, the Michelle Smith Performing Arts Library, specialized rehearsal rooms, and classrooms provide students with all the resources needed to become twenty-first century artist-citizens. The Clarice's presenting arm provides School of Music students with the opportunity to collaborate and learn from internationally recognized artists and scholars. Recent artists-in-residence have included the St. Lawrence String Quartet, the Cappella Pratensis, Etienne Charles, Tine Thing Helseth, Jeremy Denk, and Dawn Upshaw. The Michelle Smith Performing Arts Library (MSPAL) ranks among the top twenty university music libraries in the United States, and it offers a variety of archives, special collections, and other research resources that give it international stature among scholars in a broad spectrum of music disciplines. The total music collection includes approximately 50,000 books, 150,000 scores, 140,000 recordings, and 4,500 linear feet of archival materials. The International Piano Archives at Maryland (IPAM) is the only institutional collection in existence devoted to historic piano performance. IPAM contains 40,000 recordings, 8,500 music scores, 2,500 books, and a collection of reproducing pianos with 8,000 piano rolls. To date, IPAM has acquired the collections of more than 40 eminent pianists. The MSPAL Special Collections in Performing Arts embrace a growing number of national and international music organization archives representing music education, band history, solo and ensemble instrumental performance, music librarianship, and ethnomusicology. Materials in these archives include papers, music scores, recordings,

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Music, Master of Arts (M.A.)

The Master of Arts Degree (Thesis or Non-Thesis Optionsa in Musicology or Music Theory) requires a minimum of 30 credit hours, with a minimum of 12 credit hours in Major Studies. In addition, a grade of B- or better is required in all courses used to fulfill requirements for the degree. Students must write an oral defense of the Thesis (or research papers) must be passed; and a written comprehensive examination must be passed. Specific courses are required in each area of specialization.

M.A. in Musicology - Thesis or Non-thesis Option

Course	Title	Credits
Required courses:		
MUSC6xx	Seminars	6
MUSC646	Introduction to Musicology	3
MUSC677	Introduction to Ethnomusicology (Introduction to Ethnomusicology)	3
MUSC electives		12
Thesis or Non-Thesis Requirements		**6**
Thesis:		
MUSC799	Master's Thesis Research	
Non-Thesis:		
MUSC6xx	Seminar	
MUSC699	Selected Topics in Music (with advisor)	
Total Credits		**30**

M.A. in Music Theory (thesis option only)

Course	Title	Credits
Required courses:		
MUSC651	The Theories of Heinrich Schenker	3
MUSC661	Theory and Analysis of Atonal and Twelve-Tone Music	3
MUSC699T	Critical Concepts in Music Theory	3
MUSC675	Music Theory Pedagogy	3
MUSC4xx/6xx	Electives in Music Theory	6
MUSC646	Introduction to Musicology	3
Music History course		3
Thesis or Non Thesis Requirements		**6**
Thesis:		
MUSC799	Master's Thesis Research	
Non Thesis		
MUSC699	Selected Topics in Music (Independent Study)	
MUSC4xx/6xx	Elective in Music Theory	
Total Credits		**30**

Music, Doctor of Philosophy (Ph.D.)

The Doctor of Philosophy degree requires the satisfactory completion of a significant body of coursework that, in the student's and Graduate Advisor's judgement, prepares the student for the preliminary examination that leads to admission to candidacy, as well as certain specific courses required in each area of specialization. A grade of B- or better is required in all courses used to fulfill requirements for the degree. A Principal Advisor for the dissertation will be chosen by the student and the academic advisor; the Principal Advisor and the student will then nominate the remaining members of the dissertation committee. The student must submit a detailed Prospectus of the dissertation to the members of the dissertation committee and the Graduate Director, and must be admitted to candidacy prior to the approval of the dissertation committee by the Graduate School. The dissertation must be successfully defended before the entire dissertation committee. The Doctor of Philosophy degree requires a Written Dissertation.

Advance to Candidacy: In addition to completing the course requirements below, students must complete a pre-candidacy portfolio. The portfolio should include a first year paper, second year paper, public lecture, and teaching demonstrations. Students must also pass a preliminary examination, successfully defend the dissertation prospectus, and obtain IRB approval in order to advance to candidacy.

Post-Candidacy: Complete at least 12 credits of MUSC899 doctoral dissertation research and successfully defend and submit an original dissertation.

Ph.D. in Musicology

Course	Title	Credits
Required courses:		
MUSC646	Introduction to Musicology	3
MUSC677	Introduction to Ethnomusicology (Introduction to Ethnomusicology)	3
Remainder of coursework selected with Advisor		21
Dissertation Research Requirements		
MUSC899	Doctoral Dissertation Research	12
Total Credits		**39**

Ph.D. in Music Theory

Course	Title	Credits
Required courses:		
MUSC651	The Theories of Heinrich Schenker	3
MUSC661	Theory and Analysis of Atonal and Twelve-Tone Music	3
MUSC675	Music Theory Pedagogy	3
MUSC699T	Critical Concepts in Music Theory	3
MUSC699	Independent Study	1
MUSC4xx/6xx	Electives in Music Theory	12
MUSC646	Introduction to Musicology	3
Dissertation Research Requirements		

MUSC899	Doctoral Dissertation Research	12
Total Credits		**40**

Music: Performance and Composition (MUSC)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Music offers programs of study leading to the Master of Arts degree with areas of specialization in ethnomusicology, music history and literature (musicology), music education, and music theory; the Master of Music degree with areas in performance, composition, conducting, and music education; the Doctor of Philosophy degree with areas of specialization in ethnomusicology, musicology, music education, and music theory; and the Doctor of Musical Arts degree with areas of specialization in composition, performance, and conducting.

Financial Assistance

A number of competitive fellowships, graduate assistantships, teaching assistantships, opera assistantships, and orchestral assistantships are available. Preference for financial assistance will be given to those who have filed an application for admission to the University and the School of Music Supplemental Application by December 1 (for performance programs) and January 15 (for Music Education only) and have been officially admitted.

Contact

School of Music: The Academic Handbook is available online (http://www.music.umd.edu/current_students/handbooks/) and provides descriptive information, details of course requirements, examination procedures, and graduation requirements for the M. A., M. M., D. M. A., and Ph. D. degree programs. International students should read the information contained in the International Applicants section of the Graduate Admission Application.

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Admissions

General Requirements

- Statement of Purpose and Letters of Recommendation: The statement of purpose and three letters of recommendation will be required to be uploaded in the Supplementary Application, not the Graduate School's application.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3): The statement of purpose and three letters of recommendation will be required to be uploaded in the Supplementary Application, not the Graduate School's application.
- School of Music Application (https://music.umd.edu/admissions/graduate/) (Available September 1)
- Additional requirements depending on instrument/major. For more information, please visit the School of Music website (https://www.music.umd.edu/prospective_students/auditions/)

Admission to the graduate degree programs in music is highly selective. It is determined primarily by a performance audition, tapes and scores of original compositions, scholarly research papers, letters of recommendation, and/or successful teaching experience; additionally, in some academic areas, the general GRE scores are considered. All non-native English-speaking students must achieve a score of 575/233/100 on the TOEFL to be invited for audition/admission (see the School of Music's admission website (http://www.music.umd.edu/prospective_students/application_materials/#international) for detailed English language requirements).

We require a passing TOEFL score (minimum 100 IBT, 233 CBT, 575 PBT) for all applicants whose primary language is not English before we will process your application or consider you for a live audition. The requirement will be waived for applicants who have earned an undergraduate degree from an institution in the United States or another approved English-speaking country. Waivers will only be granted if at least three years of the undergraduate education took place at an English-speaking institution. Graduate degrees or performance certificates or diplomas will not exempt an applicant from submitting a passing TOEFL score. Please go here (http://www.music.umd.edu/prospective_students/application_materials/#international) for more specific information.

The School of Music will allow all graduate applicants whose overall TOEFL score is 90 or higher to audition, but in order to be considered for admission a fully passing TOEFL score must be submitted no later than February 15. Auditions will not be scheduled for applicants with an overall TOEFL score lower than 90.

APPLICATION DEADLINES

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Requirements

- Music: Performance and Composition, Doctor of Musical Arts (D.M.A.) (p. 307)
- Music: Performance and Composition, Master of Music (M.Mus.) (p. 310)

Facilities and Special Resources

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Music: Performance and Composition, Doctor of Musical Arts (D.M.A.)

The Doctor of Musical Arts degree requires the satisfactory completion of a significant body of coursework that, in the student's and Graduate Advisor's judgement, prepares the student for the preliminary examination that leads to admission to candidacy, as well as certain specific courses required in each area of specialization. A grade of B- or better is required in all courses used to fulfill requirements for the degree. A dissertation (whether written, or in project form) is required for all doctoral degrees in music. A principal advisor for the dissertation will be chosen by the student and the academic advisor; the principal advisor and the student will then nominate the remaining members of the dissertation committee. The student must submit a detailed prospectus of the dissertation to the members of the dissertation committee and the graduate director, and must be admitted to candidacy prior to the approval of the dissertation committee by the Graduate School. The dissertation must be successfully defended before the entire dissertation committee. The Doctor of Musical Arts degree requires a Written Dissertation, a Recording Project, a Performance Project, or a Musical Composition. Some Doctoral of Musical Arts degrees have an option of a Written Dissertation or a Performance Dissertation.

D.M.A. in Composition

Non-course requirements for composition students include a pre-candidacy scholarly paper and a recital presentation of original music composed while in the degree program at Maryland. The recital presentation must take place prior to the defense of the dissertation project.

Course	Title	Credits
MUSP719	Interpretation and Repertoire (MUSP719T - Lessons)	8
Studies in Areas Supporting the Major [1]		15
Other course in Music [2]		5
Dissertation Research Requirements		
MUSP899	Doctoral Dissertation Research	12
Total Credits		**40**

1 Including MUSC675

2 Including MUSC648

D.M.A. in Conducting

Non-course requirements for conducting students include proficiencies in diction, voice, and piano. Students must also submit a pre-candidacy paper.

Choral Conducting Specialization

Course	Title	Credits
Performance, Principal Medium		
MUSP719	Interpretation and Repertoire (MUSP719U)	6
MUSP815	Interpretation, Performance, and Pedagogy (MUSP815U)	4
Performance-Related Courses		
MUSC659	Seminar in Repertoire and Pedagogy	8
MUSC645	Seminar in Vocal Pedagogy	3
MUSC757	Aural Skills for Conductors	1

MUSC758	Advanced Aural Skills for Conductors	3
Academic Courses in Music [1]		9
Dissertation Research Requirements		
MUSC899	Doctoral Dissertation Research	6
MUSP899	Doctoral Dissertation Research	6
Total Credits		**46**

[1] Including MUSC648

Orchestral Conducting Specialization

Course	Title	Credits
Performance, Principal Medium		
MUSP719	Interpretation and Repertoire (MUSP719U)	6
MUSP815	Interpretation, Performance, and Pedagogy (MUSP815U)	4
Performance-Related Courses		
MUSC689	Advanced Conducting	2
MUSC659	Seminar in Repertoire and Pedagogy	6
MUSP679	Practicum	2
MUSC629	Ensemble	1
MUSC757	Aural Skills for Conductors	1
MUSC758	Advanced Aural Skills for Conductors	3
Academic Courses in Music [1]		9
Dissertation Research Requirements		
MUSP899	Doctoral Dissertation Research	6
MUSC899	Doctoral Dissertation Research	6
Total Credits		**46**

[1] Including MUSC648

Wind Conducting Specialization

Course	Title	Credits
Performance, Principal Medium		
MUSP719	Interpretation and Repertoire (MUSP719U)	6
MUSP815	Interpretation, Performance, and Pedagogy (MUSP815U)	4
Performance-Related Courses		
MUSC689	Advanced Conducting	2
MUSC659	Seminar in Repertoire and Pedagogy (MUSC659C)	6
MUSP679	Practicum	3
MUSC757	Aural Skills for Conductors	1
MUSC758	Advanced Aural Skills for Conductors	3
Academic Courses in Music [1]		9
Dissertation Research Requirements		
MUSP899	Doctoral Dissertation Research	6
MUSC899	Doctoral Dissertation Research	6
Total Credits		**46**

[1] Including MUSC648

D.M.A. in Performance

All students in the Performance track must also submit a pre-candidacy paper. Additional non-course requirements may vary in each specialization.

Piano Solo specialization

Course	Title	Credits
Performance, Principal Medium		
MUSP719	Interpretation and Repertoire (MUSP719A)	2
MUSP815	Interpretation, Performance, and Pedagogy (MUSP815A)	4
MUSP816	Interpretation, Performance, and Pedagogy (MUSP816A)	4
Performance-Related Courses		
MUSC800	Advanced Seminar in Music Pedagogy (MUSC800P)	3
MUSC801	Advanced Seminar in Music Pedagogy (MUSC801P)	3
MUSC830	Doctoral Seminar in Music Literature (MUSC830P)	3
MUSC831	Doctoral Seminar in Music Literature (MUSC831P)	3
Academic Courses in Music		
MUSC648	Seminar in Music Research	3
Two additional courses		6
Dissertation		**12**
Performance Dissertation:		
MUSP899	Doctoral Dissertation Research	
Written Dissertation:		
MUSC899	Doctoral Dissertation Research	
MUSP899	Doctoral Dissertation Research	
Total Credits		**43**

Collaborative Piano specialization

Course	Title	Credits
Performance, Principal Medium		
MUSP719	Interpretation and Repertoire (MUSP719A)	2
MUSP815	Interpretation, Performance, and Pedagogy (MUSP815A)	4
MUSP816	Interpretation, Performance, and Pedagogy (MUSP816A)	4
Performance-Related Courses		
MUSC800	Advanced Seminar in Music Pedagogy (MUSC800A)	3
MUSC801	Advanced Seminar in Music Pedagogy (MUSC801A)	3
MUSC802	Advanced Seminar in Music Pedagogy III (MUSC802A)	3
MUSC830	Doctoral Seminar in Music Literature (MUSC830A)	3
MUSC831	Doctoral Seminar in Music Literature (MUSC831A)	3
MUSC832	Doctoral Seminar in Music Literature (MUSC832A)	3
Academic Courses in Music		
MUSC648	Seminar in Music Research	3
Two additional courses		6
Dissertation		**12**
Performance Dissertation:		
MUSP899	Doctoral Dissertation Research	
Written Dissertation:		
MUSC899	Doctoral Dissertation Research	

MUSP899	Doctoral Dissertation Research	
Total Credits		**49**

Strings specialization

Students in the Strings specialization must participate in orchestra for each of the first four semesters in which they receive applied instruction in their major performance area.

Course	Title	Credits
Performance, Principal Medium		
MUSP719	Interpretation and Repertoire (MUSP719A)	2
MUSP815	Interpretation, Performance, and Pedagogy (MUSP815A)	4
MUSP816	Interpretation, Performance, and Pedagogy (MUSP816A)	4
Performance-Related Courses		
MUSC800	Advanced Seminar in Music Pedagogy (MUSC800S)	3
MUSC801	Advanced Seminar in Music Pedagogy (MUSC801S)	3
MUSC830	Doctoral Seminar in Music Literature (MUSC830S)	3
MUSC831	Doctoral Seminar in Music Literature (MUSC831S)	3
Academic Courses in Music		
MUSC648	Seminar in Music Research	3
Two additional courses		6
Dissertation		**12**
Performance Dissertation:		
MUSP899	Doctoral Dissertation Research	
Written Dissertation:		
MUSC899	Doctoral Dissertation Research	
MUSP899	Doctoral Dissertation Research	
Total Credits		**43**

Voice specialization

Students in the Voice specialization must complete one year each (or its equivalent) of college-level study of Italian, French, and German. Students must also pass the piano proficiency exam.

Course	Title	Credits
Performance, Principal Medium		
MUSP719	Interpretation and Repertoire (MUSP719B)	2
MUSP815	Interpretation, Performance, and Pedagogy (MUSP815B)	4
MUSP816	Interpretation, Performance, and Pedagogy (MUSP816B)	4
Performance-Related Courses		
MUSC800	Advanced Seminar in Music Pedagogy (MUSC800V)	3
MUSC801	Advanced Seminar in Music Pedagogy (MUSC801V)	3
MUSC830	Doctoral Seminar in Music Literature (MUSC830V)	3
MUSC831	Doctoral Seminar in Music Literature (MUSC831V)	3
Academic Courses in Music		
MUSC648	Seminar in Music Research	3
Two additional courses		6
Dissertation		**12**
Performance Dissertation:		
MUSP899	Doctoral Dissertation Research	
Written Dissertation:		
MUSC899	Doctoral Dissertation Research	
MUSP899	Doctoral Dissertation Research	
Total Credits		**43**

Voice Pedagogy specialization

Voice Pedagogy students must complete one year each (or its equivalent) of college-level study of Italian, French, and German. Students must also pass a piano proficiency exam.

Course	Title	Credits
Performance, Principal Medium		
MUSP719	Interpretation and Repertoire (MUSP719B)	2
MUSP815	Interpretation, Performance, and Pedagogy (MUSP815B)	4
MUSP816	Interpretation, Performance, and Pedagogy (MUSP816B)	4
Performance-Related Courses		
MUSC800	Advanced Seminar in Music Pedagogy (MUSC800V)	3
MUSC801	Advanced Seminar in Music Pedagogy (MUSC801V)	3
MUSC830	Doctoral Seminar in Music Literature (MUSC830V)	3
MUSC831	Doctoral Seminar in Music Literature (MUSC831V)	3
Academic Courses in Music		
MUSC648	Seminar in Music Research	3
Two additional courses		6
Dissertation		**12**
Performance Dissertation:		
MUSP899	Doctoral Dissertation Research	
Written Dissertation:		
MUSC899	Doctoral Dissertation Research	
MUSP899	Doctoral Dissertation Research	
Total Credits		**43**

Voice Opera specialization

Students in the Voice Opera specialization must complete one year each (or its equivalent) of college-level study of Italian, French, and German. Students must complete an advanced diction course if they do not have prior experience. Students must also complete a piano proficiency exam.

Course	Title	Credits
Performance, Principal Medium		
MUSP719	Interpretation and Repertoire (MUSP719B)	2
MUSP815	Interpretation, Performance, and Pedagogy (MUSP815B)	4
MUSP816	Interpretation, Performance, and Pedagogy (MUSP816B)	4
MUSP817	Interpretation, Performance, and Pedagogy (MUSP817X)	4
Performance-Related Courses		

MUSC800	Advanced Seminar in Music Pedagogy (MUSC800V)	3
MUSC801	Advanced Seminar in Music Pedagogy (MUSC801V)	3
MUSC830	Doctoral Seminar in Music Literature (MUSC830V)	3
MUSC831	Doctoral Seminar in Music Literature (MUSC831V)	3
MUSC811	Doctoral Opera Techniques	2
MUSC812	Doctoral Opera Techniques II	2
MUSC813	Doctoral Opera Techniques III	2
MUSC814	Doctoral Opera Techniques IV	2
Academic Courses in Music		
MUSC648	Seminar in Music Research	3
Two additional courses		6
Dissertation		**12**
Performance Dissertation:		
MUSP899	Doctoral Dissertation Research	
Written Dissertation:		
MUSC899	Doctoral Dissertation Research	
MUSP899	Doctoral Dissertation Research	
Total Credits		**55**

Winds and Percussion specialization

Course	Title	Credits
Performance, Principal Medium		
MUSP719	Interpretation and Repertoire	2
MUSP815	Interpretation, Performance, and Pedagogy	4
MUSP816	Interpretation, Performance, and Pedagogy	4
Performance-Related Courses		
MUSC800	Advanced Seminar in Music Pedagogy (MUSC800W)	3
MUSC801	Advanced Seminar in Music Pedagogy (MUSC801W)	3
MUSC830	Doctoral Seminar in Music Literature (MUSC830W)	3
MUSC831	Doctoral Seminar in Music Literature (MUSC831W)	3
MUSC608 or MUSC629	Chamber Music Repertory Ensemble	2
Academic Courses in Music		
MUSC648	Seminar in Music Research	3
Two additional courses		6
Dissertation		**12**
Performance Dissertation:		
MUSP899	Doctoral Dissertation Research	
Written Dissertation:		
MUSC899	Doctoral Dissertation Research	
MUSP899	Doctoral Dissertation Research	
Total Credits		**45**

Music: Performance and Composition, Master of Music (M.Mus.)

The Master of Music Degree (Non-Thesis Option in Composition, Conducting, Music Education, or Performance) requires a minimum of between 31 and 36 credit hours depending on the specific program. Required coursework is distributed among three areas of study: Major studies, Studies in Areas Supporting the Major, and Other Studies in Music. In addition, a grade of B- or better is required in all courses used to fulfill requirements for the degree; a scholarly research paper must be written as part of MUSC648 or MUED690; a Final Project must be completed satisfactorily; and an oral comprehensive examination of courses required in Major Studies and in Studies in Areas Supporting the Major must be passed. Specific courses are required in each area of specialization.

M.M. in Composition

(minimum of 30 credits beyond the Bachelor's degree)

Course	Title	Credits
Core Requirements		
Major Studies in Music		10
Studies in Areas Supporting the Major		15
Other Courses in Music		6
Scholarly paper		
Total Credits		**31**

M.M. in Conducting

(minimum of 30 credits beyond the Bachelor's degree)

Course	Title	Credits
Specialization Requirements		
Select one of the following:		32-34
Choral Conducting specialization:		
Major Studies in Music (10 credits minimum)		
Studies in Areas Supporting the Major (15 credits minimum)		
Academic Courses in Music (9 credits minimum) [1]		
Scholarly paper		
Instrumental Conducting specialization:		
Major Studies in Music (10 credits minimum)		
Studies in Areas Supporting the Major (13-14 credits minimum)		
Advanced Courses in Music (9 credits minimum) [1]		
Scholarly paper		
Total Credits		**32-34**

[1] Including MUSC648

M.M. in Performance

(minimum of 30 credits beyond the Bachelor's degree)

Course	Title	Credits
Core Requirements		
Major Studies in Music (10 credits minimum)		10
Studies in Areas Supporting the Major (credits may vary per specialization)		12-17
Academic Courses in Music (9 credits minimum) [1]		9
Specialization Requirements		
Select one of the following:		
Jazz		
Piano Solo		

Collaborative Piano	
Strings	
Voice [1]	
Opera [2]	
Winds	
Percussion	
Total Credits	**31-36**

1 The M.M. in Voice (Solo) requires one year (or its equivalent) of college level German, plus one year of either French or Italian.

2 The M.M. in Opera requires one year (or its equivalent) of college level Italian, plus one year of either French or German and a piano proficiency exam.

National Security Studies (Z003)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- National Security Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 311)

National Security Studies, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Networking Software Development (Z119)

Graduate Certificate Program
College: Engineering

ABSTRACT

The aim of the Graduate Certificate in Networking Software Development is to encourage the students to acquire specialized knowledge and skills in the technical areas of networking and software development. We have positioned this Certificate to expose the students to both computer networking and software development, which will allow them to go through a well-balanced coursework in excess of the Master's degree requirements. While completing the certificate program, students will also acquire/develop additional practical problem-solving, programming and analytical skills. Typical industry positions our students take after graduation that would benefit from this Certificate include: software engineer or software quality engineer (for a networking device vendor such as Cisco or a cloud service provider such as Amazon), system engineer, or cloud engineer.

CONTACT

Master's in Telecommunications Program Office
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University of Maryland
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Telephone: 301.405.3682
Fax: 301.314.9324
Email: telecomprogram@umd.edu

Website: http://www.telecom.umd.edu (http://www.telecom.umd.edu/)

Courses: ENTS (p. 811)

Admissions

The Certificate in Computing Systems is only available to current Telecommunications (p. 398) students.

Requirements

- Networking Software Development, Post-Baccalaureate Certificate (P.B.C.) (p. 311)

Networking Software Development, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
At least two of the following courses:		6
ENTS689	Special Topics in Telecommunications (ENTS689A - Algorithms and Data Structures)	
ENTS669	Special Topics in Computing (ENTS669X - Special Topics in Networking)	
At least two of the following courses:		6
ENTS689	Special Topics in Telecommunications (ENTS689G - Design and Analysis of Communication Networks)	
ENTS649	Special Topics in Networking (ENTS649X - Special Topics in Networking)	

ENTS749	Advanced Topics in Networking (ENTS749X - Advanced Topics in Networking)	
Total Credits		**12**

Neuroscience and Cognitive Science (Z037)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Neuroscience and Cognitive Science (NACS) Program offers a Post-Baccalaureate Certificate for students pursuing graduate degrees in related departmental programs. This certificate program allows students to obtain significant interdisciplinary training that complements their graduate degree in a NACS-related discipline. The NACS Certificate serves to acknowledge this training.

Contact

Pam Komarek
Assistant Director
0219 Cole Student Activities Building
4095 Union Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.8910
Email: pkomarek@umd.edu

Website: http://www.nacs.umd.edu

Courses: NACS **(**https://academiccatalog.umd.edu/graduate/courses/nacs/**)**

Admissions

Only students enrolled in a Ph.D. degree program at the University of Maryland, College Park will be eligible for the NACS Certificate. Students enrolled in the NACS Ph.D. program are not eligible. Interested students are encouraged to contact the NACS office for advisement on coordinating the NACS Certificate requirements with their Ph.D. requirements. Admission will be at the discretion of the NACS Graduate Director, with the advice and consent of the NACS Executive Committee. Students must submit a letter to the NACS Graduate Director requesting admission to the Certificate Program and outlining their plan of study for the NACS Certificate. Students must also identify a NACS faculty member to serve as their Certificate advisor. In many cases this may be the student's existing departmental Ph.D. advisor. Study for the Certificate must be completed by the end of the fifth year after admission to the program.

1. Completed application to the NACS Certificate program.
2. PDF copy of unofficial UM transcript.
3. Letter from primary advisor endorsing the application to the NACS Certificate program.

All files should be submitted electronically, with a strong preference for PDF files. Please use transparent file names that start with your name, i.e., smith_application.pdf, smith_transcript.pdf, smith_endorsement.pdf. Send files together in **one** email message to Pam Komarek, NACS Assistant Director, at pkomarek@umd.edu.

Requirements

- Neuroscience and Cognitive Science, Post-Baccalaureate Certificate (P.B.C.) (p. 312)

Neuroscience and Cognitive Science, Post-Baccalaureate Certificate (P.B.C.)

16 credits required

Students must complete the following courses with a grade of B (3.0) or better in each class.

1. Students must complete a core of 10 credits, in addition to their Ph.D. course requirements, comprising at least two of the courses within the NACS core curriculum (NACS641, NACS642, NACS643, NACS644, NACS645, all 4 credit courses) and two semesters of NACS608, one credit per semester.
2. Students must complete at least 6 additional credits from graduate courses approved by the NACS program. The student's NACS advisor and the NACS Graduate Director must approve the courses taken to fulfill these credits. Courses taken at the 400-level require the approval of the NACS Graduate Director.

Course	Title	Credits
NACS608	Neuroscience and Cognitive Science Seminar [1]	2
Select 6 credits of Electives approved by advisor		6
Select two of the following:		8
NACS641	Introduction to Neurosciences	
NACS642	Cognitive Neuroscience	
NACS643	Computational Neuroscience	
NACS644	Cellular and Molecular Neuroscience	
NACS645	Cognitive Science	
Total Credits		**16**

[1] 1 credit per semester, 2 credits total.

Neuroscience and Cognitive Science (NACS)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The NACS program offers a wide range of research and training opportunities for students who are interested in pursuing doctoral-level research in a variety of areas within neuroscience and cognitive science. Faculty research interests center around seven main areas: Cellular & Molecular, Sensory & Motor Systems, Computational Modeling & Theory, Language & Speech, Cognition & Emotion, Development & Aging, and Disorders & Treatment. Research approaches include both the theoretical and experimental, with several laboratories doing both. Research and training activities of NACS take place within the laboratories of faculty in 20 participating departments and units: Aerospace Engineering, Animal and Avian Sciences, Biology, Computer Science, Electrical and Computer Engineering, English, Entomology, Epidemiology & Biostatistics, Hearing and Speech Sciences, Human Development,

Kinesiology, Linguistics, Philosophy, Psychology, and Teaching and Learning, Policy and Leadership, as well as the Center for Advanced Study of Language, the Institute for Advanced Computer Studies, the Institute for Systems Research, the Maryland Neuroimaging Center, and the Second Language Acquisition program. The NACS program requires the completion of two required core courses and three out of five core courses, including introduction to neurosciences, cognitive neuroscience, computational neuroscience, cellular and molecular neuroscience, and cognitive science. The goal of the Program is to bring together the diverse perspectives and strengths of all the included disciplines in order to understand the working of the nervous system, the mind, and behavior. For more information, please visit our website: http://www.nacs.umd.edu.

Financial Assistance

Fellowships are available on a competitive basis to both entering and continuing students, while qualified students may also receive teaching assistantships. In addition, some faculty have research assistantships for their students.

Contact

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Website: http://www.nacs.umd.edu

Courses: NACS (p. 918)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Writing Sample
- CV/Resume

For more admissions information or to apply to the program, please visit our Graduate School website: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 1, 2021

Other Deadlines: Please visit the program website at http://www.nacs.umd.edu

Requirements

- Neuroscience and Cognitive Science, Doctor of Philosophy (Ph.D.) (p. 314)
- Neuroscience and Cognitive Science, Master of Science (M.S.) (p. 313)

Facilities and Special Resources

The Program, by virtue of its breadth, has access to the facilities of all the departments, institutes, and centers of its faculty members. These include the Institute for Systems Research, the Institute for Advanced Computer Studies, the Center for Advanced Study of Language, the Maryland Neuroimaging Center, and the various well-equipped research laboratories and department facilities of the faculty. Animal facilities are available where necessary. NACS has developed close collaborations with the National Institutes of Health (NIH), Children's National Medical Center (CNMC), and Walter Reed National Military Medical Center (WRNMMC). NACS students can conduct research in laboratories with NACS adjunct faculty at these institutions. Thus, these relationships extend research and training opportunities for students while they get their degrees from the NACS program.

Neuroscience and Cognitive Science, Master of Science (M.S.)

Thesis option: 31 credits required
Non-thesis option: 31 credits required

Please note, students are not directly admitted into the master's program. The M.S. in NACS is awarded en route to the Ph.D.

Course	Title	Credits
NACS600	Ethics in Scientific Research	2
NACS640	Foundational Readings Seminar	2
Select 12 credits of Electives		12
Select three courses, with at least one in each area:		9
Cognitive Area:		
NACS642	Cognitive Neuroscience	
NACS645	Cognitive Science	
Neuroscience Area:		
NACS641	Introduction to Neurosciences	
NACS643	Computational Neuroscience	
NACS644	Cellular and Molecular Neuroscience	
Thesis or Non-Thesis Requirements		**6**
Thesis:		
NACS799	Master's Thesis Research	
Non-Thesis:		
NACS798	Master's Non-Thesis Research	
Total Credits		**31**

Neuroscience and Cognitive Science, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 37 credits, including 12 credits of NACS899. Specific course requirements include two core courses--a scientific ethics course and a foundational readings course--and three out of five core courses from among introduction to neuroscience, cognitive neuroscience, computational neuroscience, cellular and molecular neuroscience, and cognitive science. Non-course requirements include completing a First Year Research Project, pass the Qualifying Exam, submit a Dissertation Proposal, and pass the Ph.D. Defense.

A qualifying examination is given at the beginning of the third year to ensure that all students have a core knowledge of basic neuroscience and cognitive science and know how to apply it to their own research area, and that each student has the knowledge and skills necessary to develop a dissertation proposal.

Effective Spring 2021: Students are admitted to candidacy upon passing the Qualifying Exam. By the end of their fourth year, students formally present their dissertation proposal. The dissertation is normally completed within one year of the proposal defense, and within five years of entering the program.

Course	Title	Credits
NACS600	Ethics in Scientific Research	2
NACS640	Foundational Readings Seminar	2
Select 9 credits of Supplemental Courses		9
Select three courses, with at least one in each area:		12
Cognitive Area:		
NACS642	Cognitive Neuroscience	
NACS645	Cognitive Science	
Neuroscience Area:		
NACS641	Introduction to Neurosciences	
NACS643	Computational Neuroscience	
NACS644	Cellular and Molecular Neuroscience	
Dissertation Research Requirements		
NACS899	Doctoral Dissertation Research	12
Total Credits		**37**

Nonprofit Management and Leadership (Z116)

Graduate Certificate Program
College: Public Policy

Abstract

The Nonprofit Management and Leadership Certificate is a four-course (twelve-credit) graduate certificate program that is designed to provide invaluable skills and experiences to enable students to delve deeply into the complex challenges facing nonprofit leaders. The certificate will equip students to be able to formulate innovative strategies, negotiate the complexities of global philanthropy and NGO leadership, develop entrepreneurial skills, engage in major international issues in the developing world, employ their skills to advance the work of nonprofit organizations, and make a significant difference around the globe.

contact

Office of Student Affairs
School of Public Policy
2101 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://publicpolicy.umd.edu

Courses: PLCY (https://academiccatalog.umd.edu/graduate/courses/plcy/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program Specific Requirements

- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	January 7, 2022

International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	N/A	N/A

RESOURCES AND LINKS:
Program Website: www.publicpolicy.umd.edu (https://www.publicpolicy.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Nonprofit Management and Leadership, Post-Baccalaureate Certificate (P.B.C.) (p. 315)

Nonprofit Management and Leadership, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
PLCY798	Readings in Public Policy (Nonprofit and NGO Management and Leadership)	3
PUAF688	Course PUAF688 Not Found (PUAF688F - Nonprofit Financial Management)	3
Select two of the following:		6
PUAF689	Course PUAF689 Not Found (PUAF689Y - Theory, Practice, and New Paradigms in Nonprofit Fundraising)	
PUAF689	Course PUAF689 Not Found (PUAF689Z - Strategic Management for Nonprofit and Public Organizations)	
PUAF689	Course PUAF689 Not Found (PUAF689P - Strategic Philanthropy)	
PUAF688	Course PUAF688 Not Found (PUAF688O - China's Dynamic Philanthropic and Social Sector Landsc)	
Total Credits		**12**

Nutrition and Food Science (NUTR/FDSC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Graduate Program in Nutrition and Food Science is an interdisciplinary and interdepartmental program administered by the Department of Nutrition and Food Science (NFSC). The program draws upon faculty and scientists from numerous schools, departments, and organizations. These include the Departments of Animal and Avian Sciences, Anthropology, Cell Biology and Molecular Genetics, Chemistry and Biochemistry, Nutrition and Food Science, and Plant Science and Landscape Architecture; the School of Public Health; and nearby research institutions. The Director of the Graduate Program in Nutrition and Food Science is selected from amongst faculty to administer the program.

The program offers graduate study leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Nutrition and Food Science with specialization in either Nutrition or Food Science. All programs require completion of a research project (thesis or dissertation). Programs of research are individually planned with the student, an advisor and an appropriate Graduate Advisory Committee. Research interests of faculty members specializing in Nutrition include the genetic and metabolic basis for dietary requirements of animals and humans, nutritional biochemistry, nutritional aspects of chronic disease, international nutrition, community nutrition, epidemiology, neuroscience, health behavior and health promotion. Research interests of faculty members specializing in Food Science include food chemistry, food processing and engineering, food microbiology, food safety, food nanotechnology, food toxicology, public policy, risk assessment and functional and nutraceutical foods.

Financial Assistance

Financial support for graduate students is available on a competitive basis. The Department of Nutrition and Food Science offers a number of graduate teaching assistantships that support students in the program. A limited number of research assistantships are also available. Applications for teaching assistantships for the fall semester are due around mid-February for continuing students. New students who are interested in a teaching position should contact their advisor for information. International students who wish to be considered for a teaching assistantship and are not native speakers of English are required by the university to take part in the International Teaching Assistant (ITA) evaluation prior to the start of classes. This includes taking the Test of Spoken English (TSE) and submitting official test scores. International teaching assistants who may have been educated entirely in English and those with a bachelor's and/or master's degree from universities in English-speaking countries must also be evaluated. Decisions regarding teaching assistantships are usually reached by April 1. Graduate teaching assistants receive a stipend plus health insurance. Tuition fees (up to 10 credits per semester) for teaching assistants are waived by the university. Programs in Biochemistry, Chemistry, and Cellular Biology and Molecular Genetics, administered in the corresponding departments, also offer teaching assistantships to qualified students in the Graduate Program in Nutrition and Food Science. Students are encouraged to submit teaching assistantship applications to those programs. A limited number of research assistantships are available from grant funds, with the student assisting in the research supported under the grant. The research often may be applicable to the thesis or dissertation. The tuition for graduate research assistants is charged at the in-state rate and often is paid directly by the supporting grant. In addition, research assistants receive health insurance. Research assistantships generally are not awarded until after students have attended classes and are known to faculty. Additional types of financial aid are available, including a work-study program, grants, fellowships and loans. For more information regarding financial support, please refer to the Graduate School website at www.gradschool.umd.edu (http://www.gradschool.umd.edu).

Contact

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Website: https://nfsc.umd.edu/graduate (https://nfsc.umd.edu/graduate/)

Relationships: Animal Sciences (ANSC) (p. 38) Neurosciences and Cognitive Science (NACS) (p. 312)

Courses: NFSC (https://academiccatalog.umd.edu/graduate/courses/nfsc/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Description of Research/Work Experience (optional)

For the Nutrition concentration, please apply to program code NUTR. For the Food Science concentration, please apply to program code FDSC.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	December 15, 2021	September 30, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 15, 2021	September 30, 2021

RESOURCES AND LINKS:

Program Website: http://www.nfsc.umd.edu
Application Process: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Requirements

- Nutrition and Food Science, Doctor of Philosophy (Ph.D.) (p. 317)
- Nutrition and Food Science, Master of Science (M.S.) (p. 316)

Facilities and Special Resources

The Graduate Program office is housed within the Department of Nutrition and Food Science in Room 0112 in the Skinner Building.

Program facilities are located in the Departments of Nutrition and Food Science, Animal and Avian Sciences, Anthropology, Cell Biology and Molecular Genetics, Chemistry and Biochemistry, and Plant Science and Landscape Architecture. There are also collaborative arrangements with the National Institutes of Health (NIH), Food and Drug Administration (FDA), and U.S. Department of Agriculture (USDA). Additionally, opportunities exist for collaborative research with scientists at the FDA through the Joint Institute for Food Safety and Applied Nutrition.

Library facilities and resources are extensive. In addition to campus libraries, the National Archives, the National Agricultural Library, the Library of Congress, and the National Library of Medicine are all within 10 miles of campus and are available to students.

Nutrition and Food Science, Master of Science (M.S.)

Thesis only: 30 credits

Requirements for the M.S. degree in Nutrition and Food Science are a minimum of 30 graduate credits of course work including a minimum of 12 credits of 600 level courses and a minimum of 6 graduate credits of masters thesis research (NFSC799)[1]. A minimum GPA of 3.0 is required to maintain good academic progress for graduation. The student must complete a thesis and successfully defend their research before a graduate faculty advisory committee approved by the Graduate School. An average duration of a Master's project is 2-3 years depending upon prior education and experience.

[1]The Master's Thesis Research will not be required for students in the Dietetics Track of the Nutrition Specialization. Dietetics students will substitute the thesis credits with approved course and Capstone Project.

Course	Title	Credits
Required courses:		
NFSC688	Seminar in Nutrition and Food Science	2
NFSC799	Master's Thesis Research	6
Select one graduate level statistics course		3
Specialization Requirements		
Select one of the following options:		19
Nutrition (NUTR) THESIS		
Nutrition (NUTR) PROPOSE TO ADD A NUTRITION: NON THESIS DIETETICS TRACK		
Food Science (FDSC) THESIS		
Total Credits		**30**

Nutrition and Food Science, Doctor of Philosophy (Ph.D.)

Requirements for the Ph.D. degree in Nutrition and Food Science include a mastery of the broad fundamentals of area of specialty, as well as the demonstrated ability to conduct independent research. Course requirements include: a minimum of 27 graduate credits of coursework including 9 credits of advanced nutrition/food science courses, beyond the M.S. degree and 12 credits of NFSC899. A minimum GPA of 3.0 is required to maintain good academic progress for graduation. The average duration of a Ph.D. degree program is 4-5 years, depending upon prior education and experience.

Advance to Candidacy: In addition to course requirements, students are admitted to full candidacy for the Ph.D. upon passing a comprehensive exam on core knowledge of nutrition/food science and submitting and presenting a research proposal.

Post-Candidacy: The student must complete at least 12 credits of NFSC899 Doctoral Dissertation Research as well as successfully defend an original dissertation before their graduate faculty advisory committee.

Course	Title	Credits
NFSC688	Seminar in Nutrition and Food Science	3
Statistics course at the 600-level or higher		3
Remainder of coursework		9
Dissertation Research Requirements		
NFSC899	Doctoral Dissertation Research	12
Total Credits		**27**

Organic and Sustainable Agriculture (Z090)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

ABSTRACT

The Graduate Certificate in Organic and Sustainable Agriculture (GC-OSA) is a 12-credit graduate program that can be completed in twelve months of continuous study. The GC-OSA focuses on sustainability through examining both the ecosystem services provided by beneficial insects, as well as the management of injurious insects. Ecological functions of insects in the natural and anthropogenic landscape is illustrated and discussed. The program includes the development of a list of sustainable practices for conserving and managing insects in the landscape. Students learn pest management options that do not require the use of synthetic chemical pesticides and focuses on organic alternative.

Contact

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Website: http://oes-entm.umd.edu/

Relationships: Applied Entomology (MPAE) (p. 46) Beekeeping (Z088) (p. 69) Integrated Pest Management (Z089) (p. 254) Organic and Sustainable Agriculture (Z090) (p. 317) Urban Agriculture (Z091) (p. 407)

Courses: ENTM (https://academiccatalog.umd.edu/graduate/courses/entm/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (1)
- Bachelor's degree in a biological field (exceptions can be made with work experience in a biological field and strong letters of recommendation)
- GPA of 3.0 or higher (exceptions can be made with work experience in a biological field and strong letters of recommendation)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	August 19, 2022	February 18, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	August 19, 2022	February 18, 2022

RESOURCES AND LINKS:

Program Website: oes-entm.umd.edu (http://oes-entm.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Organic and Sustainable Agriculture, Post-Baccalaureate Certificate (P.B.C.) (p. 318)

Organic and Sustainable Agriculture, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

In this 12-credit certificate, students learn about sustainability through examining both the ecosystem services provided by beneficial insects, as well as the management of injurious insects.

Course	Title	Credits
Required courses:		
ENTM710	Insect Biodiversity, Physiology and Ecology	3
ENTM735	Sustainability	3
ENTM730	Plant Diagnostics	3
ENTM740	Organic Practices	3
Total Credits		**12**

Performance (MFAP)

Graduate Degree Program
College: Arts and Humanities

Abstract

The three-year M.F.A. in Performance will offer admission once every three years to experienced performers. This unique world-class graduate program offers an array of studies and opportunities designed to explore the broad spectrum of American and International performance traditions while laying the foundation for individual ground-breaking approaches to personalized expression and teaching skills. We are looking for motivated visionaries with unique voices who would appreciate a performance-based graduate program designed to guide and support them on their journey from idea to revelation, from exploration to ownership. Currently the M.F.A. in Performance program is not accepting applications.

Financial Assistance

The School of Theatre, Dance, and Performance Studies is housed in the Clarice Smith Performing Arts Center at Maryland. This state-of-the-art facility includes the 650-seat Ina and Jack Kay Theatre, the 200-seat Robert and Arlene Kogod Theatre and the 100-seat Cafritz Theatre.

The campus is within a few miles of the John F. Kennedy Center for the Performing Arts, Arena Stage, the National Theatre, Ford's Theatre, The Shakespeare Theatre at the Lansburgh, and the Olney Theatre Center, which are among more than 80 professional area theatres. Two of the greatest libraries in the world, the Library of Congress and the Folger Shakespeare Library, are in close proximity to campus. Students also make regular use of the Smithsonian Institution, the Federal Theatre Project Archives, the National Archives, and more than 50 specialized libraries and institutions in the Washington metropolitan area.

Website: tdps.umd.edu (p. 14)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample: A sample of work, uploaded to the Upload Requirements section of the application.
- Teaching Resume: Entered in the Employment History section of the application.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Not Accepting Applicants
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrant	Not Accepting Applicants

RESOURCES AND LINKS:
Program Website: http://www.tdps.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Performance, Master of Fine Arts (M.F.A.) (p. 318)

Facilities and Special Resources

The School of Theatre, Dance, and Performance Studies is housed in the Clarice Smith Performing Arts Center at Maryland. This state-of-the-art facility includes the 650-seat Ina and Jack Kay Theatre, the 200-seat Robert and Arlene Kogod Theatre and the 100-seat Cafritz Theatre.

The campus is within a few miles of the John F. Kennedy Center for the Performing Arts, Arena Stage, the National Theatre, Ford's Theatre, The Shakespeare Theatre at the Lansburgh, and the Olney Theatre Center, which are among more than 80 professional area theatres. Two of the greatest libraries in the world, the Library of Congress and the Folger Shakespeare Library, are in close proximity to campus. Students also make regular use of the Smithsonian Institution, the Federal Theatre Project Archives, the National Archives, and more than 50 specialized libraries and institutions in the Washington metropolitan area.

Performance, Master of Fine Arts (M.F.A.)

M.F.A. in Performance applicants must provide CV; One page statement of goals in relation to your creative and research interests; teaching resume; video of introduction and creative work; and three letters

of recommendation from professional directors, teachers or artistic collaborators. Callbacks are held in February.

The MFA in Performance is currently on hiatus. Please contact the School of Theatre, Dance, and Performance Studies regarding future recruitment.

Philosophy (PHIL)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Department of Philosophy offers graduate study leading to the Master of Arts and Doctor of Philosophy degrees with emphasis on contemporary Anglo-American philosophy and the interaction of philosophy with other disciplines. Students often enter the doctorate program without an M.A. degree, but the M.A. may be earned on the way to the Ph.D. While the Ph.D. program is suitable primarily for students who wish to enter a career in teaching and research at the college or university level, the M.A. program is appropriate for those who want to deepen and expand the knowledge they gained as undergraduates or who wish to develop competence in philosophy to apply to some other professional field.

Financial Assistance

The Department administers a number of graduate assistantships and fellowships. Virtually all applicants admitted to the doctoral program are offered support, typically a combination of teaching assistantships and fellowships.

Contact

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Website: http://www.philosophy.umd.edu

Courses: PHIL (p. 922)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- Writing Sample

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	7 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	7 Jan

Other Deadlines: Please visit the program website at http://www.philosophy.umd.edu

Requirements

- Philosophy, Doctor of Philosophy (Ph.D.) (p. 319)
- Philosophy, Master of Arts (M.A.) (p. 319)

Facilities and Special Resources

A number of other departments and programs at the University offer graduate students additional opportunities for coursework and research.

In addition to the excellent libraries on campus, students may use other libraries in the Washington/Baltimore metropolitan area, such as the Library of Congress, the Center for Hellenic Studies, and the Eisenhower Library on the campus of Johns Hopkins University.

The Department sponsors a series of colloquia by visiting and local speakers throughout the academic year.

Philosophy, Master of Arts (M.A.)

Non-thesis only: 30 credits required

Students must complete ten three-hour courses, or a total of thirty hours of course work. Two of these courses must be Core Courses, the remaining eight graduate seminars offered by the Department. Additional details may be found in the Graduate Handbook on the Department's www site: http://www.philosophy.umd.edu.

Course	Title	Credits
Required courses:		
PHIL660	Metaphysics, Mind, and Language	3
PHIL640	Value Theory	3
Select remainder of coursework		24
Fulfill a Logic Requirement		
Complete a Scholarly paper		
Total Credits		**30**

Philosophy, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 36 credits in addition to 12 credits of PHIL899. Students are also required to complete a History requirement and a Logic requirement which does not count towards the

total course or credit total. For the Prospectus Requirement, students must form a Prospectus Examining Committee, write a Dissertation Prospectus, and have the Prospectus approved by the Prospectus Examining Committee at a formal Prospectus Meeting. In addition all students who have completed the coursework component of the program are required to audit at least one course in each semester thereafter.

Students who seek admission to the Ph.D. program normally should intend to pursue only full-time study toward that degree.

In addition to the Graduate School requirements, students must complete twelve three-hour courses, or a total of thirty-six hours of course work. Two of these courses must be Core Courses, the remaining ten graduate seminars offered by the Department. Additional details may be found in the Graduate Handbook on the Department's www site. Foreign language skills are required only as demanded by the individual student's research.

Partial credit toward the Ph.D. requirements may be awarded for relevant work done at other graduate institutions. The Director of Graduate Studies will make a specific determination in each case.

Course	Title	Credits
Required courses:		
PHIL660	Metaphysics, Mind, and Language	3
PHIL640	Value Theory	3
Select one course in the Philosophy of Science		3
Select remainder of coursework		27
Dissertation Research Requirements		
PHIL899	Doctoral Dissertation Research	12
Total Credits		**48**

Physical Activity (PHAC)

Graduate Degree Program
College: Public Health

Abstract

The Master of Public Health (MPH) degree with a concentration in Physical Activity is a 45-credit professional degree, administered by the Department of Kinesiology. All MPH students with a concentration in Physical Activity will complete five public health core courses, eight courses in the physical activity and related cognate area, an internship, and a capstone project.

Contact

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Website: http://www.sph.umd.edu
Courses: KNES (p. 886)

Admissions

The MPH in Physical Activity program has a two-step application process. Applicants first submit the SOPHAS application (www.sophas.org (https://sophas.org/)), the centralized application service for schools and programs of public health (Step 1). Once the SOPHAS application has been verified applicants will submit their UMD Supplemental application (Step 2). Applicants will receive an email from the SPH Admissions team with instructions for how to complete the UMD Supplemental Application. Applications will not be reviewed until both the SOPHAS and UMD Supplemental applications are completed.

GENERAL ADMISSION REQUIREMENTS

- A Bachelor's degree
- Minimum 3.0 undergraduate GPA
- At least one undergraduate math course
- Transcripts from all previous coursework
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose and objectives including career and educational goals, professional experience, and areas of interest

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS application (Step 1) & UMD Supplemental application (Step 2)
- Three letters of recommendation
- Resume or curriculum vitae
- Official GRE Test Score submission is not required. GRE scores won't be reviewed.
- Applicants being considered for the program may be invited for a virtual interview via Zoom.

For detailed instructions on how to submit your application, please visit the School of Public Health Website: (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/))

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	SOPHAS - Priority: 17 Dec / Final: 6 May
	Supplemental - Priority: 14 Jan / Final: 3 Jun
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	SOPHAS - Priority: 17 Dec / Final: 11 Feb
	Supplemental - Priority: 14 Jan / Final: 11 Mar

RESOURCES AND LINKS

Program Website: https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-physical-activity (https://sph.umd.edu/

academics/masters-degrees/mph-master-public-health/mph-physical-activity/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Physical Activity, Master of Public Health (M.P.H.) (p. 321)

Facilities and Special Resources

The Department of Kinesiology has three areas of specialization: Cognitive Motor Neuroscience, Exercise Physiology, and Physical Cultural Studies. Laboratories are maintained, which support original investigations in each of the three areas. Laboratories include equipment for measuring metabolic parameters, strength, body composition, postural sway, ground reaction forces, amount of physical activity in daily life, as well as muscle biopsies and movement analysis. The response of the human body to physical activity/exercise can be viewed through ECG, EEG, EMG and systematic behavior observation systems. Each of the three research areas has interfaced computer hardware and software to support data collection and analysis. Collaborations with the School of Medicine at the Baltimore campus and with NIH often result in the availability of other facilities and equipment. All graduate students have access to computers and other forms of technology. Details and pictures of current facilities and equipment are available at our website: www.sph.umd.edu/KNES/ (http://www.sph.umd.edu/KNES/).

Physical Activity, Master of Public Health (M.P.H.)

Non-thesis only (capstone project required): 45 credits

The Master of Public Health (MPH) degree with a concentration in Physical Activity is a 45-credit professional degree, administered by the Department of Kinesiology.

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
KNES600	Kinesiology in Public Health	3
KNES601	Epidemiology of Physical Activity	3
KNES602	Physical Activity Program Planning and Evaluation	3
Research Methods course:		3
EPIB710	Grantsmanship for Epidemiologic Research	
or FMSC780	Qualitative Methods in Family and Health Research	
or HLTH625	Community Assessment through Qualitative Methods	
or HLTH710	Methods and Techniques of Research	
or KNES610	Methods and Techniques of Research	
Electives		12
KNES778	Internship in Physical Activity and Public Health	4
KNES786	Capstone Project in Physical Activity and Public Health	3
Total Credits		**45**

Physics (PHYS)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract

A fuller picture of the Department of Physics can be found on the department's home page, http://umdphysics.umd.edu; only a summary is provided here. The Department of Physics offers graduate courses on general and specialized topics in advanced physics, and has active research programs in many areas of current interest. The various research groups can be browsed at http://umdphysics.umd.edu/research/research-areas.html.

Financial Assistance

The Department offers both teaching and research assistantships. Combined with fellowships in some cases, virtually all Ph.D. students have full financial support for the duration of their graduate studies. In a typical semester, approximately 50 teaching assistants and 160 research assistants work in the Department, while some others are supported by nearby government and industry facilities at which they are doing their research. Summer research stipends for advanced graduate students are customary, and a few summer teaching assistantships are available.

Contact

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College Park, MD 20742
Telephone: 301.405.5982
Email: grad@physics.umd.edu

Website: http://www.umdphysics.umd.edu

Courses: PHYS (p. 925)

Relationships: Biophysics (BIPH) (p. 86) Chemical Physics (CHPH) (p. 115)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- GRE Subject (Physics) (optional)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationphys1.pdf)

The University of Maryland Department of Physics has a strong national and international reputation, and receives a large number of applications each year from well-qualified students. Consequently, admission to the graduate degree program is quite selective.

Students who enter the graduate program are normally expected to have strong backgrounds in physics, including intermediate-level courses in mechanics, electricity and magnetism, physical optics, quantum physics, and thermodynamics. Prior research experience and strong letters of recommendation are highly valued. Good preparation in mathematics is also desirable, especially for students who may pursue theoretical physics research.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 10, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 10, 2021

RESOURCES AND LINKS:

Program Website: http://www.umdphysics.umd.edu
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Physics, Doctor of Philosophy (Ph.D.) (p. 322)
- Physics, Master of Science (M.S.) (p. 322)

Facilities and Special Resources

Current research in the Department spans an immense range of theoretical and experimental work on the forefront of knowledge, far too large to describe here. Details of current research in the various fields, faculty, and facilities involved can be found at the Departmental web site, http://umdphysics.umd.edu.

There are close academic ties with the Institute for Physical Science and Technology on the campus; members of the Institute supervise graduate research and also teach physics courses. Faculty members in the departments of Astronomy and Electrical & Computer Engineering also frequently direct thesis research.

The University of Maryland is located within the metropolitan area of Washington, D.C., where it enjoys the proximity of a large number of outstanding institutions, such as NASA's Goddard Space Flight Center, the Naval Research Laboratory, the National Institute of Standards and Technology, the Johns Hopkins Applied Physics Laboratory, the Department of Energy, the National Institutes of Health, the Library of Congress, and other federal institutions. The Department works closely with certain research groups at some of these institutions, and a significant fraction of graduate students do their primary research at off-campus facilities, co-directed by a member of the graduate faculty in the Department. In order to facilitate graduate study in the Washington area, the Department of Physics also has adjunct professors from certain government laboratories.

Physics, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly report): 30 credits

The Department offers both thesis and non-thesis options in its Master of Science program. However, virtually all physics graduate students are admitted directly to the Ph.D. program, and may, if they choose, obtain a Master's naturally in the course of their Ph.D. studies. A student interested instead in a terminal Master's degree should consult with the Physics Department. The Departmental requirements for the non-thesis option include: a total of 30 credits excluding research credits; four courses covering core graduate-level physics (this requirement may be waived based on a student's performance on the Ph.D. qualifying exam); a paper as evidence of ability to organize and present a written scholarly report on contemporary research. The thesis option replaces the scholarly paper requirement with the writing of a thesis and the passing of an oral examination in defense of the thesis.

Course	Title	Credits
Core Requirements		**30**
Four courses covering core graduate-level physics [1]		
Thesis or Non-Thesis Option		
Thesis:		
PHYS799	Master's Thesis Research	
Pass an oral examination		
Non-Thesis:		
Complete a scholarly report		
Total Credits		**30**

[1] This requirement may be waived based on a student's performance on Ph.D. qualifying exam.

Physics, Doctor of Philosophy (Ph.D.)

The requirements for the Doctor of Philosophy degree in physics are set in general terms to allow the individual student as much freedom as possible to prepare a course of study suited to individual needs. These requirements are: competence in standard topics of graduate-level physics indicated by a satisfactory performance on a qualifying examination—the qualifying exam requirement may be waived by the Department if competence in these topics is demonstrated through performance in courses covering core graduate physics topics; the giving of an oral Preliminary Research Presentation demonstrating the ability to organize and orally present a topic of current research interest in physics; a paper showing the student's ability to organize and present a written scholarly report on contemporary research prior to candidacy; advanced course study consisting of at least three courses at the 600-level or above (of at least 3 credits each) excluding courses covering core graduate physics subjects, seminar courses or independent studies;

active participation in at least two hours of seminar, 12 hours of thesis research, and the presentation and defense of an original dissertation.

Course	Title	Credits
Any three graduate-level courses of three credits or more excluding seminars, independent study courses, or courses on core graduate-level physics subjects		
Non-credit Foundations and Frontiers of Physics seminar		
Select two semesters of a physics seminar course		
Pass the qualifying exam or have this exam requirement wavied on the basis of performance in course work		
Give a Preliminary Research presentation after passing the qualifying exam		
Submit a scholarly paper		
Dissertation Research Requirements		
PHYS899	Doctoral Dissertation Research	12
Total Credits		**12**

Plant Science (PLSC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Plant Science (PLSC) graduate program is a diverse and dynamic program that prepares graduates for careers that address issues facing modern-day society. The program offers training in diverse concentrations that include Agronomy, Cell Biology, Functional Genomics, Molecular Physiology, Conservation Biology and Ecology, Pathology, Food Safety and Quality, and Landscape Ecosystems Management. Students are trained and mentored by graduate faculty that focus on interdisciplinary education, mastery and application to their chosen area of study. All PLSC graduate training is thesis-based, and an emphasis is placed on research, discovery learning and critical thinking, rather than coursework. Students work directly with internationally-recognized graduate faculty who are leaders in their disciplines. Students are guided in their studies by a major professor as well as a graduate advisory committee selected by the student from experts on campus, at nearby research institutions, and at other universities. The program offers Master of Science and Doctor of Philosophy degrees. The goal of the Plant Science graduate program is to (1) provide students with the skills in analyzing and interpreting quantitative and qualitative information; using inductive and deductive reasoning; and communicating in both verbal and written form; (2) train the next generation of plant science researchers using cutting edge methodologies and approaches to lead public and private efforts to provide a secure, safe and nutritious food and fiber supply, maintain and restore ecosystems, combat the challenges of climate change on our food and fiber supply, and provide high quality plant science education; (3) advance knowledge in plant sciences that is critical to the improvement of the efficiency, profitability and sustainability of global and national agricultural and natural resources. The Plant Science graduate program seeks to maximize the close association of the many national laboratories (USDA, FDA, NASA, NIST, NIH, DOE, etc.) through collaborations and cooperative agreements with the department and the University of Maryland. As a result, graduates of the program are particularly well trained for employment in public and private sector research and leadership positions.

Financial Assistance

A limited number of research assistantships and teaching assistantships are available for qualified applicants. There is strong competition for these awards, and candidates are encouraged to submit their applications as early as possible in the semester preceding anticipated enrollment in the Department.

Contact

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PLSC Graduate Admission and Examination Review Committee Chair
Department of Plant Science and Landscape Architecture
2126 Plant Sciences Building
4291 Fieldhouse Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4369
Fax: 301.314.9308
Email: plscgradadmissions@umd.edu

OR

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OR

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Email: dcortez@umd.edu

Website: https://psla.umd.edu/graduate/prospective-students (https://psla.umd.edu/graduate/prospective-students/)

Courses: PLSC **(**p. 933**)**

Relationships: Landscape Architecture (LARC) **(**p. 269**),** Extension Education (AEED) **(**https://academiccatalog.umd.edu/graduate/programs/extension-education-aeed/**)**

Admissions
General Requirements

- Statement of Purpose (500 words or fewer)
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Description of Research/Work Experience
- Faculty of Interest
- Writing Sample 1
- Graduate Record Examination (GRE) (optional)
- GRE Subject (optional)
- Portfolio PDF Upload (optional)
- Writing Sample 2 (optional)

Admission to the program requires a Bachelor's degree from an accredited College or University in the United States or the equivalent in a foreign country. Applicants are expected to have a 3.0 cumulative grade point average (4.0 scale) in all previous academic work, or equivalent. All applicants are encouraged to contact prospective advisors ahead of application

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Fall 2022: January 11, 2022	September 29, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Fall 2022: January 11, 2022	September 29, 2021

Other Deadlines: Please visit the program website at https://psla.umd.edu/graduate/prospective-students (https://psla.umd.edu/graduate/prospective-students/)

Requirements

- Plant Science, Doctor of Philosophy (Ph.D.) (p. 325)
- Plant Science, Master of Science (M.S.) (p. 324)

Facilities and Special Resources

Department facilities for conducting research in plant science are located at the College Park campus in the Plant Science Building and Research Greenhouse Complex. Modern laboratories are equipped for genomic, molecular genetic, cell biological, physiological, microbiological and biochemical research in plant science. Equipment and expertise for next generation sequencing, life science imaging, bioinformatics, genomics, proteomics, and metabolomics are available either in the department or on campus. Extensive controlled-environment facilities, including growth chambers and a large and modern greenhouse complex are complemented by a large network of field research facilities located strategically across the state representing various environments with different climates and soil types. Students have access to computer labs and shared processing arrays and a comprehensive computer center located on campus. The University Libraries on campus and both the National Agriculture Library and Library of Congress located nearby make the library resources accessible to students among the best in the nation. Many of the Department's projects are conducted in cooperation with other departments on campus and with professionals at the Food and Drug Administration facility near the campus and the headquarters of the USDA Agricultural Research Service located three miles from campus in Beltsville. Scientists at the Geologic Survey, the National Academy of Sciences, NASA, National Institutes of Health, Department of Energy, Smithsonian, and National Park Service, as well as other agencies, have cooperated with the Department's faculty on various projects. Scientists from some of these agencies have adjunct appointments in the Department, have taught special courses at the University, and participate on graduate committees.

Plant Science, Master of Science (M.S.)

Thesis only: 30 credits

A program of study approved by the Advisor must be completed prior to the second semester of enrollment. This plan must be filed with the Graduate Director. The program requires a minimum of 30 semester hours of course work beyond the B.S. degree, including 6 hours of thesis research credits (799). A minimum of 12 credit hours must be earned in course-work at the 600 level or higher. Students are also required to complete one semester hour of PLSC618 and one semester hour of PLSC619. Students must also complete one semester each of 400-level (or higher) biochemistry, plant physiology, and statistics which may be completed as part of a B.S. or M.S. degree program.

A thesis must be submitted to the Graduate School. This thesis is approved by the Thesis Examining Committee appointed by the Dean of the Graduate School upon the recommendation of the student's advisor. The advisor serves as the chairperson of the examining committee and the student's advisory committee typically serves as members of the examining committee. Committee membership must comply with Graduate School requirements for membership. The submitted thesis must comply with the University of Maryland Thesis and Dissertation Style Guide.

It is the responsibility of the Advisor and Student to ensure that all University Research Assurances are followed. Research involving human subjects must be approved in advance by the Institutional Review Board (IRB). Research involving the use of vertebrate animals must be approved in advance by the Animal Care and Use Committee. Research using hazardous materials (chemical or biological), recombinant RNA/DNA must be approved in advance by the appropriate University committee

Course	Title	Credits
Core Requirements		
PLSC608	Research Methods	2
PLSC618	Advances in Research; Critiquing Primary Plant Science Literature	1
PLSC619	Seminars in Plant Science and Landscape Architecture	1
PLSC799	Master's Thesis Research	6
Additional coursework		20
Total Credits		**30**

Plant Science, Doctor of Philosophy (Ph.D.)

A program of study approved by the Advisor must be completed by the end of the third semester of enrollment. This plan must be filed with the Graduate Director. The Graduate School requires that every student seeking the Ph.D. satisfactorily complete a minimum of 12 semester hours of dissertation credits (899). Students are also required to complete one semester hour of PLSC618 and one semester hour of PLSC619. Students are also required to complete 2 semester hours of PLSC608. In addition students admitted to the PhD program that lack the MS degree must complete the course requirements of the MS degree (24 credit hours of coursework). Students must also complete one semester each of 400-level (or higher) biochemistry, plant physiology, and statistics which may be completed as part of a B.S. or M.S. degree program and an additional graduate level course in biochemistry or statistics.

An oral qualifying examination must be completed satisfactorily before a student is admitted to candidacy. At the discretion of the advisor and advisory/examining committee a written exam may also be conducted. The examination must be attempted by the end of the fifth semester of study. Under extenuating circumstances and with written permission of the Program Director, this time frame may be extended. The examining committee corresponds to the student's Advisory committee. To be eligible to take the candidacy examination, the student must have submitted a research proposal that has been approved by the student's advisor and Advisory Committee prior to the formal qualifying examination. The completed proposal must be given to the committee at least two weeks before the scheduled date for the qualifying examination. The qualifying examination focuses principally on the written proposal. However, the student's mastery of general knowledge of Plant Science may also be examined. At the end of the examination, all members of the committee vote on the student's performance. Two negative votes constitute failure. Upon successful completion of the examination, the committee recommends to the Director that the student by admitted to candidacy based on satisfactory performance during the examination. It is the responsibility of the student to submit an application for admission to candidacy when all the requirements for candidacy have been fulfilled. Students failing the qualifying examination may be re-examined once within 6 months of the first examination date. Students may be re-examined only once. Failure to pass the qualifying examination a second time will result in termination of the student's program.

A dissertation based on independent, original research must be submitted to the Program and the Graduate School. This dissertation is approved by the Dissertation Examining Committee appointed by the Dean of the Graduate School upon the recommendation of the student's advisor. The advisor serves as the chairperson of the examining committee and the student's advisory committee typically serves as members of the examining committee. Committee membership must comply with Graduate School requirements for membership. The submitted dissertation must comply with the University of Maryland Thesis and Dissertation Style Guide.

It is the responsibility of the Advisor and Student to ensure that all University Research Assurances are followed. Research involving human subjects must be approved in advance by the Institutional Review Board (IRB). Research involving the use of vertebrate animals must be approved in advance by the Animal Care and Use Committee. Research using hazardous materials (chemical or biological), recombinant RNA/DNA must be approved in advance by the appropriate University committee

Course	Title	Credits
Required courses:		
PLSC608	Research Methods	2
PLSC618	Advances in Research; Critiquing Primary Plant Science Literature	1
PLSC619	Seminars in Plant Science and Landscape Architecture	1
Select one of the following:		16-24
Doctoral students without an M.S. degree in Plant Science or closely related discipline are required to complete 24 credits of coursework		
Doctoral students with an M.S. degree in Plant Science or closely related discipline are required to complete 16 credits of coursework		
Dissertation Research Requirements		
PLSC899	Doctoral Dissertation Research	12
Total Credits		**32-40**

Policy Studies (POSI)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, international development, international security and economic policy, social policy, non-profit management, public management and leadership, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research. The Ph.D. program trains policy analysts who will make their marks in the practice and teaching of public policy. To this end, a limited number of applicants are admitted annually. In their first year, students develop and demonstrate proficiency in economic, normative, political, and quantitative analysis. They then pursue advanced study within their chosen specialization. Finally, they complete and defend a doctoral dissertation. Those awarded the degree move on to public policy careers in government, research, academia, and the private sector.

Financial Assistance

The School has financial aid available in the form of fellowships, graduate assistantships, and employment. All qualified applicants meeting appropriate deadlines are considered.

Contact

Office of Student Affairs
2101 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Courses: PLCY (p. 929)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)
- Description of Research: Describe the research areas you are interested in, the research problem(s) on which you would like to work, and their relevance / significance.(uploaded to the Uploads Requirements section of the application)
- Writing Sample: The writing sample should be relatively recent, and should preferably demonstrate the applicant's ability to structure and analyze a problem, or critique/develop a viewpoint. (uploaded to the Uploads Requirements section of the application)

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Preferred: 3 Dec / Final: 13 Mar
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	Preferred: 3 Dec / Final: 13 Mar

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Policy Studies, Doctor of Philosophy (Ph.D.) (p. 326)

Policy Studies, Doctor of Philosophy (Ph.D.)

All students are required to choose an advisor within their first year.

The Ph.D. in Policy Studies program enables students to develop in-depth knowledge of the field and to conduct cutting-edge research on public policy and management issues. Students are required to complete at least 24 credits of appropriate coursework, including two required research methods courses. In addition, students must take 12 credits of dissertation research. Students are required to pass exams in the basic disciplines of public policy and two field exams, usually with both a written and oral component, in broad topics relevant to their proposed thesis topics. They then develop and defend a dissertation prospectus followed by the dissertation itself.

The Ph.D. in Policy Studies is principally directed at students who have a master's degree in public policy or a related field, such as economics, statistics, education or international relations, from a program comparable in quality and content to one of the School's own master's programs. Students may apply while in the final year of such a program. Applications will also be considered from recent college graduates without a master's degree who have an outstanding academic record.

Most students will be required to maintain full-time status through completion of the course work leading up to their exams and thesis proposal; this typically requires two to three years. Some students will be admitted on a part-time basis with an agreed schedule to ensure timely completion. A faculty member at the School must agree to serve as the Ph.D. applicant's academic sponsor at the time of admission into the program. To facilitate the selection of a sponsor, applicants should include, as part of their application, a description of the general areas in which they want to study and write their dissertation.

Course	Title	Credits
Core Requirements		
Complete 24 credits including the following:		24
PLCY798	Readings in Public Policy (PLCY 798R)	
PLCY798	Readings in Public Policy (PLCY 798Z)	
Dissertation Research Requirements		
PLCY899	Doctoral Dissertation Research	12
Total Credits		**36**

Population Studies (Z036)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The Certificate Program in Population Studies provides interdisciplinary training in demographic methods, theory, and research for graduate students in departments affiliated with the Maryland Population Research Center (MPRC), culminating in a Certificate in Population Studies for graduate students who complete the required coursework. Historically, the Population Sciences were born out of the discipline of

Demography, a field that boomed during the 1950s around fears of a world-wide population explosion and its consequences. Demography was taught largely within departments of Sociology. Today the field has changed a great deal and researchers worry about issues of low fertility and underpopulation as much as overpopulation. What demographers of the 1950s missed in their dire predictions were unprecedented behavioral changes of families to changing economic circumstances, changing social pressures, and changing ideas of what constituted a family. Today, the core of the population sciences is not forecasting population growth and its components (mortality, fertility and immigration) but instead understanding what economic, social, and ideational factors affect these components and how changing mortality, fertility, and immigration may affect other family choices. With the growing emphasis on choice and on the consequences of population change, and with the shift from being a field focusing on forecasting to one focusing on understanding causal relationships, training across several fields of study has become necessary.

Contact

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Judith Hellerstein, Ph.D.
Professor
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Telephone: 301.405.3545
Email: hellerst@umd.edu

Website: https://www.popcenter.umd.edu (https://www.popcenter.umd.edu/resources/scholar-dev/demography-cert/certificate/)

Courses: S (p. 951)ee interdisciplinary listing (https://www.popcenter.umd.edu/resources/scholar-dev/demography-cert/list-of-courses/)

Admissions

The Certificate Program is offered to students enrolled in a Ph.D. program at the University of Maryland College Park. Please contact your department for more information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the department website	Please visit the department website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the department website	Please visit the department website

Other Deadlines: Please visit the program website at http://www.popcenter.umd.edu

Requirements

- Population Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 327)

Facilities and Special Resources

The Maryland Population Research Center (MPRC) is a multidisciplinary center dedicated to the support and advancement of population research. We provide a research environment conducive to interdisciplinary collaboration among our diverse Faculty Associates and to the development of young scholars through cross-disciplinary training and mentoring. Our proximity to Washington DC allows us to develop strong relationships with the U.S. federal statistical agencies and with policy communities. These ties provide our researchers access to under-utilized or restricted-use government data, allow them to partner with agencies on research and data improvement projects, and allow them to provide policy makers with non-partisan, scientific evidence on population-related issues. MPRC provides work and collaboration spaces, computers loaded with specialized software for statistical analysis, SAS, Stata, and other training courses, and administrative and financial support for associated graduate students.

Population Studies, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

The Certificate requires a minimum of four courses (12 credits) including two required core courses and two electives. At least one course taken for the Certificate must be from a department other than the student's home unit. (See the Certificate information page on the MPRC website (http://www.popcenter.umd.edu/resources/scholar-dev/demography-cert/certificate/) for details.) Students must achieve a GPA of 3.0 or higher in these four courses. Previously earned credits may be retroactively applied toward the Certificate. Students may apply to participate in the Certificate Program at any time up until the semester before they intend to graduate. Applications may be accessed by following the link above.

Course	Title	Credits
SOCY611	Introduction to Demographic Methods	3
SOCY630	Population and Society	3
or ECON772	Population Economics	
Select two electives approved by advisor		6
Total Credits		**12**

Principles of Public Health (Z076)

Graduate Certificate Program
College: Public Health

Abstract

The University of Maryland School of Public Health offers a post-baccalaureate Certificate in Principles of Public Health administered by the Department of Health Services Administration. This online 15 credit, five-course program is designed to provide working professionals with a foundation in the core principles of public health including

1. Foundations of Epidemiology
2. Introduction to Health Systems
3. Biostatistics
4. Foundations of Environmental Health
5. Health Behavior

The exceptional foundation in the Principles of Public Health will raise your career trajectory, increasing your

- Marketable expertise
- Professional flexibility and mobility
- Core public health competencies
- Career advancement readiness

You do not have to take leave time from work and can complete the certificate program in as little as eight months. You will benefit from the flexibility and accessibility of online courses that fit in with your personal and professional responsibilities. Easy to use web-based technology enables you to learn in an engaging, interactive environment. Intensive advising/mentoring enhances your learning experience.

Instruction is delivered by University of Maryland School of Public Health faculty and experts from prominent public health organizations. The University of Maryland School of Public Health is accredited by the Council on Education for Public Health.

Contact

Negin Fouladi
Program Director
Department of Health Services Administration
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4200 Valley Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2438
Email: fouladi@umd.edu

Website: http://sph.umd.edu/department/hlsa/certificate-principles-public-health **(**http://sph.umd.edu/department/hlsa/certificate-principles-public-health/**)**

Relationships: Public Health Practice and Policy (PHPP) **(**p. 339**)**

Courses: SPHL **(**https://academiccatalog.umd.edu/graduate/courses/sphl/**)**

Admissions

PART 1. SOPHAS APPLICATION

- Complete the online SOPHAS application (http://www.sophas.org/).
- Choose the University of Maryland College Park School of Public Health program (http://sophas.org/program-finder/?institution=1016) to which you would like to apply.
- You may apply to only one UMD SPH program per application cycle.
- You must send an official transcript for all completed college courses. These transcripts go directly to SOPHAS.
- We require 3 letters of recommendation. Your references will receive an email invite from SOPHAS to complete the recommendation online.
- Test scores. GRE and English proficiency (IELTS and TOEFL) scores must be sent to 5688 & 5814.
- Pay the SOPHAS application fee.
- Your SOPHAS application will go through several phases including submission, completion and verification. Verification can take up to four weeks, therefore we recommend starting the application early.

PART 2: UNIVERSITY OF MARYLAND SUPPLEMENTAL APPLICATION

- The supplemental application is completed online via an emailed invitation from the UMD graduate school.
- The invite is sent within one week of your SOPHAS verification date to the email on file with SOPHAS.
- The title of the email is 'please complete the school of public health supplemental application.'
- This application requires demographic and residency questions, transcript, and application fee.
- You must submit a PDF copy of your undergraduate degree transcript (the transcript that indicates degree awarded).
- The application fee is $75.00
- Upon completion of BOTH parts, you will receive notification of 'Under Committee Review', which means the application has been sent to the review committee.

For more information, please visit the School of Public Health website (http://sph.umd.edu/content/graduate-admissions/).

***Visa Eligibility:** UMD cannot issue the immigration documents necessary for international students to study (F1 or J1 student visas) in this program. International students who currently reside in the U.S. on existing visas may apply. Eligible international students have additional requirements per the Office of International Student & Scholar Services (https://globalmaryland.umd.edu/offices/international-students-scholar-services/) (ISSS). Additional Requirements can be found on the Office of Extended Studies website (https://oes.umd.edu/graduates-post-baccalaureates-professionals/professional-graduate-programs/graduate-programs-public-health-practice/apply/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Not accepting applications	Not accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Not accepting applications	Not accepting applications

Requirements

- Principles of Public Health, Post-Baccalaureate Certificate (P.B.C.) (p. 329)

Principles of Public Health, Post-Baccalaureate Certificate (P.B.C.)

14 credits required

The Graduate Certificate in Principles of Public Health (GC-PPH) provides working professionals with a rigorous, multi-disciplinary foundation in the five core areas of public health, advancing understanding of the science of public health.

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
Total Credits		**14**

Professional Communication for Enhanced English Fluency (online) (Z106)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The **Graduate Certificate of Professional Studies in Professional Communication for Enhanced English Fluency** (EEF) provides specialized instruction in professional speaking (voice, diction, pronunciation), professional writing (style, grammar), speaking and writing across professional communication contexts (e.g., business, health, law, politics, science), and professional speech writing. Students also advance their critical thinking and vocabulary skills through courses focused on the rhetorical analyses of public texts (e.g., debates, laws, speeches, judicial decisions), which will deepen students' knowledge of rhetoric and political culture nationally and internationally. Those enrolling in Z106 will take classes online.

Contact

Shawn J. Parry-Giles, Ph.D.
Professor and Chair
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College Park, MD 20742
Telephone: 301.405.6527
Email: spg@umd.edu

Website: http://eef.umd.edu

Courses: COMM

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmptrmpinz079z080z105andz106.pdf)
- Admissions Exams

***Visa Eligibility:** Z106 is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Not Accepting Applications
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Not Accepting Applications

Other Deadlines: Please visit the program website at http://eef.umd.edu

Requirements

- Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.) (p. 329)

Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Course	Title	Credits
Required courses:		
COMM618	Professional Communication: Rhetoric & Style	3
COMM638	Professional Communication: Rhetoric & Voice	3
COMM708	Professional Communication: Rhetoric and Context	3
COMM655	Seminar in Speechwriting	3
Select two of the following:		6
COMM601	Historical-Critical Research in Communication	
COMM604	Argumentation Theory	

COMM670	Course COMM670 Not Found	
COMM748	The Rhetoric of the Presidency	
COMM760	Seminar in Political Communication	
COMM768	Seminar in Public Address	
Total Credits		**18**

Professional Communication for Enhanced English Fluency (Z105)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The **Graduate Certificate of Professional Studies in Professional Communication for Enhanced English Fluency** (EEF) provides specialized instruction in professional speaking (voice, diction, pronunciation), professional writing (style, grammar), speaking and writing across professional communication contexts (e.g., business, health, law, politics, science), and professional speech writing. Students also advance their critical thinking and vocabulary skills through courses focused on the rhetorical analyses of public texts (e.g., debates, laws, speeches, judicial decisions), which will deepen students' knowledge of rhetoric and political culture nationally and internationally. Those enrolling in the Z105 certificate will take classes on the campus of the University of Maryland--College Park.

Contact

Shawn J. Parry-Giles, Ph.D.
Professor and Chair
Department of Communication
2130 Skinner Bldg
4300 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6527
Email: spg@umd.edu

Website: http://eef.umd.edu

Courses: COMM

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmptrmpinz079z080z105andz106.pdf)
- Admissions Exams

***Visa Eligibility:** Z105 is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Not Accepting Applications
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Not Accepting Applications

Other Deadlines: Please visit the program website at http://eef.umd.edu

Requirements

- Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.) (p. 330)

Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Course	Title	Credits
Required courses:		
COMM618	Professional Communication: Rhetoric & Style	3
COMM638	Professional Communication: Rhetoric & Voice	3
COMM708	Professional Communication: Rhetoric and Context	3
COMM655	Seminar in Speechwriting	3
Select two of the following:		6
COMM601	Historical-Critical Research in Communication	
COMM604	Argumentation Theory	
COMM670	Course COMM670 Not Found	
COMM748	The Rhetoric of the Presidency	
COMM760	Seminar in Political Communication	
COMM768	Seminar in Public Address	
Total Credits		**18**

Project Management (online) (MEPM)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our high quality, challenging project management degree programs encompass technical expertise, behavioral competence, and strategic awareness. Courses are taught not only by esteemed faculty but also by industry experts. As the first project management program in an engineering school to be accredited by the Project Management Institute's Global Accreditation Center, the University of Maryland empowers students to put high-demand project management methods into everyday practice.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENCE **(**https://academiccatalog.umd.edu/graduate/courses/ence/**)**

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus/).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:
Other Deadlines: mage.umd.edu/application-process (https://mage.umd.edu/application-process/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Project Management, Master of Engineering (M.Eng.) (p. 331)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Project Management, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		
ENCE661	Project Cost Accounting and Finance	3
ENCE662	Introduction to Project Management	3

ENCE664	Legal Aspects of Engineering Design and Construction	3
ENCE665	Management of Project Teams	3
ENCE627	Project Risk Management	3
Select 15 credits of electives approved by advisor		15
Total Credits		**30**

Project Management (online) (Z040)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our high quality, challenging project management degree programs encompass technical expertise, behavioral competence, and strategic awareness. Courses are taught not only by esteemed faculty but also by industry experts. As the first project management program in an engineering school to be accredited by the Project Management Institute's Global Accreditation Center, the University of Maryland empowers students to put high-demand project management methods into everyday practice.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENCE (https://academiccatalog.umd.edu/graduate/courses/ence/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Project Management, Post-Baccalaureate Certificate (P.B.C.) (p. 332)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Project Management, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan

for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		6
ENCE662	Introduction to Project Management	
ENCE665	Management of Project Teams	
Choose two of the following courses:		6
ENCE602	Project Procurement Management	
ENCE603	Data Analytics for Project Managers	
ENCE605	Evolving as a Project Leader	
ENCE606	Graduate Introduction to Project Scheduling	
ENCE607	Mastering Agile Project Management	
ENCE623	Introduction to Advanced Scheduling	
ENCE627	Project Risk Management	
ENCE661	Project Cost Accounting and Finance	
ENCE664	Legal Aspects of Engineering Design and Construction	
ENCE666	Cost Engineering and Control	
Total Credits		**12**

Project Management (PMPM)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our high quality, challenging project management degree programs encompass technical expertise, behavioral competence, and strategic awareness. Courses are taught not only by esteemed faculty but also by industry experts. As the first project management program in an engineering school to be accredited by the Project Management Institute's Global Accreditation Center, the University of Maryland empowers students to put high-demand project management methods into everyday practice.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENCE **(**https://academiccatalog.umd.edu/graduate/courses/ence/**)**

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Project Management, Master of Engineering (M.Eng.) (p. 334)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are

happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Project Management (MEPM) for more information.

Project Management, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		
ENCE661	Project Cost Accounting and Finance	3
ENCE662	Introduction to Project Management	3
ENCE664	Legal Aspects of Engineering Design and Construction	3
ENCE665	Management of Project Teams	3
ENCE627	Project Risk Management	3
Select 15 credits of electives approved by advisor		15
Total Credits		**30**

Project Management (Z063)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our high quality, challenging project management degree programs encompass technical expertise, behavioral competence, and strategic awareness. Courses are taught not only by esteemed faculty but also by industry experts. As the first project management program in an engineering school to be accredited by the Project Management Institute's Global Accreditation Center, the University of Maryland empowers students to put high-demand project management methods into everyday practice.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Caitlin Gover
Program Manager for Admission and Recruitment
Maryland Applied Graduate Engineering
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University of Maryland
College Park, MD 20742
Telephone: 301.405.7712
Email: cgover@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENCE **(**https://academiccatalog.umd.edu/graduate/courses/ence/**)**

Admissions
General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Project Management, Post-Baccalaureate Certificate (P.B.C.) (p. 335)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Project Management (Z040) for more information.

Project Management, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		6
ENCE662	Introduction to Project Management	
ENCE665	Management of Project Teams	
Choose two of the following courses:		6
ENCE602	Project Procurement Management	
ENCE603	Data Analytics for Project Managers	
ENCE605	Evolving as a Project Leader	
ENCE606	Graduate Introduction to Project Scheduling	
ENCE607	Mastering Agile Project Management	
ENCE623	Introduction to Advanced Scheduling	
ENCE627	Project Risk Management	
ENCE661	Project Cost Accounting and Finance	
ENCE664	Legal Aspects of Engineering Design and Construction	
ENCE666	Cost Engineering and Control	
Total Credits		**12**

Psychology (PSYC)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

Psychology is a remarkably broad field that studies mind and behavior at all levels of analysis ranging from the micro to the macro; from single cells to complex systems; from individuals to groups and cultures; and from invertebrates to humans. Some of these endeavors connect with the biological sciences and others with the social sciences. As analytical, methodological, and theoretical advances in one domain increasingly influence developments in another, psychologists collaborate in ever greater numbers with scientists in neighboring disciplines, resulting in new subfields that blend the biological and social sciences.

Our department reflects well this combined diversity of and collaborations among approaches. In recognition of this fact, we organized our training structure into 5 Ph.D. Specialty Areas:

- Clinical (CLIN)
- Cognitive and Neural Systems (CNS)
- Counseling (COUN)
- Developmental (DEV)
- Social, Decision, and Organizational Science (SDOS)

Research collaborations across areas are common and we encourage students to consider training across areas as well. The Department's doctoral programs in both Clinical and Counseling Psychology have been approved by the American Psychological Association. School Psychology, also an APA approved program, is offered in the College of Education.

Financial Assistance

The Department attempts to provide financial aid for all incoming students, although aid is not guaranteed. The different possible types of financial support include fellowships (nominated by the department), teaching assistantships, research assistantships, work on campus, and funded externships.

Contact

Office of Graduate Studies
Department of Psychology
1121 Biology-Psychology Building
4094 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.1454
Email: psycgradstudies@umd.edu

Website: http://www.psyc.umd.edu/landing/Graduate (http://www.psyc.umd.edu/landing/Graduate/)

Courses: PSYC (p. 937)

Relationships: Clinical Psychological Science (MPPS) (p. 127) Industrial/Organizational Psychology (MPIO) (p. 247) Neurosciences and Cognitive Science (NACS) (p. 312)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- GRE Subject (Psychology) (Highly recommended for Clinical Psychology only): *The GRE Psychology Subject Test must be taken by the end of the first year in the Clinical Psychology Graduate Program. Therefore, we highly recommend taking the GRE Psychology Subject Test before applying or before the start of students' first year in the program.*
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/clinical_umd_programsupplemental_fall_2022.pdf) (Clinical Psychology only)
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationpsyccounseling.pdf) (Counseling Psychology only)
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationpsycsdos2020.pdf) (Social/Decision/Organizational Sciences only)

The Department accepts only those applicants who have demonstrated competence for completing the requirements of the doctoral degree. The typical student admitted to the graduate program has an overall undergraduate grade point average of 3.5 or above, a psychology grade point average over 3.5, GRE scores of 155 and above for Verbal and 147 and above for Quantitative, appropriate background experiences, outstanding letters of recommendation, research experience and/or previous relevant work experience, and goals congruent with the program. The Department of Psychology encourages applications from members of racial/ethnic minority groups.

Students admitted to the graduate program often earn the M.S. en route to the Ph.D., however, this varies across specialty areas and the specific requirements within a given specialty area should be consulted. All students must be full-time until completion of all requirements of the doctoral program other than the dissertation has been met.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 1, 2022

RESOURCES AND LINKS:
Program Website: http://www.psyc.umd.edu/landing/Graduate (http://www.psyc.umd.edu/landing/Graduate/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Psychology, Doctor of Philosophy (Ph.D.) (p. 336)
- Psychology, Master of Science (M.S.) (p. 336)

Facilities and Special Resources

The Department of Psychology shares a building with the Biology Department and is centrally situated on campus near three libraries and the student union. The Department has state-of-the-art laboratories, computer facilities, and video equipment. The geographic location in a suburb of Washington, D.C. provides access to a wide variety of laboratory and training facilities in governmental and other agencies. In addition, we are near the national headquarters for The American Psychological Association and Association for Psychological Science.

The Department follows all regulations involved in the use of human subjects and animals.

Psychology, Master of Science (M.S.)

The department does not offer a terminal M.S. Rather, students admitted to the graduate program often earn the M.S. en route to the Ph.D.

Course	Title	Credits
Required courses:		
PSYC601	Quantitative Methods I	4
PSYC602	Quantitative Methods II	4
PSYC799	Master's Thesis Research	6
Remainder of coursework		16
Total Credits		**30**

Psychology, Doctor of Philosophy (Ph.D.)

In addition to a quantitative core consisting of three courses, all students are required to take three core courses in areas outside their specialty program. These core courses are designed to provide a breadth of knowledge in psychology. Additionally, each program has requisite coursework and comprehensive examinations. A minimum of 12 credit hours for the dissertation is required for a doctoral degree. In addition to attending classes, students are expected to take part in research.

Course	Title	Credits
Core Requirements		
Select three quantitative courses		
Select additional courses		
Dissertation Research Requirements		

PSYC899	Doctoral Dissertation Research	12
Total Credits		**12**

[1] The remainder of the student's coursework should be decided with their advisor.

Public Administration (MPPA)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

CONTACT

Office of Student Affairs
School of Public Policy
2101 Van Munching Hall
7699 Mowatt Lane
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Courses: PLCY **(**https://academiccatalog.umd.edu/graduate/courses/plcy/**)**

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Optional: Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Preferred: 16 Jan / Final: 15 May	27 Sep
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Preferred: 16 Jan / Final: 13 Mar	27 Sep

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Administration, Master of Professional Studies (M.P.S.) (p. 337)

Public Administration, Master of Professional Studies (M.P.S.)

Non-thesis only: 36 credits required

The Master's of Professional Studies in Public Administration (MPPA) program provides an in-depth education for students seeking professional careers in public administration. The MPPA requires the completion of 36 credit hours in various aspects of public administration and policy. The program can be completed in either 16 months or 21 months. It is particularly appropriate for international students and uses numerous examples and case studies from around the world. It is cohort-based, with all students in a cohort taking the same courses. Please check the School's website to find out when the next cohort is expected to be formed.

Between the first and second year, and/or during the academic year, most students engage in internships in international, federal, state or local government agencies, non-profit organizations, or private firms that are engaged in public administration. In addition to offering practical experiences and the opportunity to further develop skills acquired during the first year, these internships provide students with contacts and relationships useful for future projects and job placement.

Course	Title	Credits
Core Requirements		
PLCY610	Quantitative Aspects of Public Policy	3

PLCY670	Public Budgeting & Financial Management	3
PLCY711	Public Management and Leadership	3
PLCY699	Selected Topics Public Policy (PLCY699F)	3
Select 6 credits of electives [1]		24
Total Credits		**36**

[1] Students should consult with their advisor to determine remaining course requirements.

Public Financial Management (Z094)

Graduate Certificate Program
College: Public Policy

Admission to this certificate program is through accepted cohorts only. Please visit the department website for more information.

CONTACT

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Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- CV/Resume

***Visa Eligibility**: This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Cohort only. Please contact the department for more details.	Cohort only. Please contact the department for more details.
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Cohort only. Please contact the department for more details.	Cohort only. Please contact the department for more details.

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Financial Management, Post-Baccalaureate Certificate (P.B.C.) (p. 338)

Public Financial Management, Post-Baccalaureate Certificate (P.B.C.)

Total Credits: 12 credits required

Course	Title	Credits
Core Requirements		
Select four courses [1]		12
Total Credits		**12**

[1] All courses are chosen with the student's advisor

Public Health Informatics (Z028)

Graduate Certificate Program
College: Public Health

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.oes.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oes.umd.edu

Requirements

- Public Health Informatics, Post-Baccalaureate Certificate (P.B.C.) (p. 339)

Public Health Informatics, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Public Health Practice and Policy (PHPP)

Graduate Degree Program
College: Public Health

Abstract

Healthcare is the largest industry in the U.S. and employs over 11 million workers. 21st century health care professionals require cutting-edge knowledge and exemplary leadership skills to enable their organizations to rise to societal, technological, ethical, financial, and public health challenges. To meet the growing demand for skilled health care professionals, the Department of Health Services Administration, School of Public Health, at the University of Maryland offers an exceptional professional learning opportunity in Public Health Practice. The Master of Public Health in Public Health Practice and Policy (MPH-PHPP) is designed to provide working professionals with the broad range of knowledge and skill-based competencies needed to assume leadership roles in addressing important public health practice and policy issues nationally and globally. The program offer courses in the fall and spring semester (16 weeks each) and Summer Term (two 6-week sessions). The curriculum and degree has the same content, quality, and high standards as the University's traditional on-site curriculum and reflects the broad range of knowledge and skill-based competencies germane to public health practice in the 21st century. Instruction is delivered by School of Public Health faculty and experts from prominent public health organizations. The School of Public Health is accredited by the Council on Education for Public Health.

Contact

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Website: (https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-public-health-practice-and-policy-online/)https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-public-health-practice-and-policy-online (https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-public-health-practice-and-policy-online/)

Relationships: Health Administration (HLSA) (p. 224) Health Equity (HLEQ) (p. 225) Health Policy Analysis and Evaluation (HPAE) (p. 226) Principles of Public Health (Z076) (p. 327)

Courses: SPHL (https://academiccatalog.umd.edu/graduate/courses/sphl/) HLSA (https://academiccatalog.umd.edu/graduate/courses/hlsa/)

Admissions

The MPH in Public Health Practice and Policy program has a two-step application process. Applicants first submit the SOPHAS application (www.sophas.org (https://sophas.org/)), the centralized application service for schools and programs of public health (Step 1). Once the SOPHAS application has been verified applicants will submit their UMD Supplemental application (Step 2). Applicants will receive an email from the SPH Admissions team with instructions for how to complete the UMD Supplemental Application. Applications will not be reviewed until both the SOPHAS and UMD Supplemental applications are completed.

GENERAL ADMISSION REQUIREMENTS

- A Bachelor's degree
- Minimum 3.0 undergraduate GPA
- At least one undergraduate math course
- Transcripts from all previous coursework
- English proficiency test score (TOEFL, IELTS or PTE) (international applicants (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))
- Statement of purpose and objectives including career and educational goals, professional experience, and areas of interest

PROGRAM SPECIFIC REQUIREMENTS

- SOPHAS application (Step 1) & UMD Supplemental application (Step 2)
- Three letters of recommendation
- Resume or curriculum vitae
- Fit between applicant's goals and expectations and program degree competencies
- GRE scores are **not required** for this program

For detailed instructions on how to submit your application, please visit the School of Public Health Website: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	SOPHAS - Preferred: 17 Dec / Final: 6 May	SOPHAS - Preferred: 15 Oct / Final: 11 Nov
	Supplemental - Preferred: 14 Jan / Final: 3 Jun	Supplemental - Preferred: 11 Nov / Final: 10 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	N/A	N/A

RESOURCES AND LINKS

Office of Extended Studies (OES) Program Website: https://oes.umd.edu/professionals-post-baccalaureates/professional-graduate-programs/public-health-practice-and-policy (https://oes.umd.edu/professionals-post-baccalaureates/professional-graduate-programs/public-health-practice-and-policy/)
SPH Program Website: https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-public-health-practice-and-policy-online (https://sph.umd.edu/academics/masters-degrees/mph-master-public-health/mph-public-health-practice-and-policy-online/)
Application Process: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-process/)
Admissions FAQ: https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs (https://sph.umd.edu/admissions/graduate-admissions/graduate-application-faqs/)

Requirements

- Public Health Practice and Policy, Master of Public Health (M.P.H.) (p. 340)

Facilities and Special Resources

The Master of Public Health in Public Health Practice and Policy instruction is delivered in a blended learning format with stimulating on-line courses supplemented by a total of six weekends of residency. On-site weekend sessions will be held at the The university of Maryland College Park Campus. For more information, please see:

http://sph.umd.edu/department/hlsa/mph-public-health-practice-and-policy (http://sph.umd.edu/department/hlsa/mph-public-health-practice-and-policy/)

Public Health Practice and Policy, Master of Public Health (M.P.H.)

Non-thesis only (capstone project required): 45 credits

The Master of Public Health in Public Health Practice and Policy (MPH-PHPP) is designed to provide working professionals with the broad range of knowledge and skill-based competencies needed to assume leadership roles in addressing important public health practice and policy issues nationally and globally.

Course	Title	Credits
Required courses:		
SPHL601	Core Concepts in Public Health	1
SPHL602	Foundations of Epidemiology and Biostatistics	4
SPHL603	Public Health Data Laboratory	1
SPHL610	Program and Policy Planning, Implementation, and Evaluation	5
SPHL611	Public Health Ethics	1
SPHL620	Leadership, Teams, and Coalitions: Policy to Advocacy	2
HLSA745	Public Health Practice and Management	3
HLSA720	Health Law and Ethics	3
HLSA775	Public Health Research	3
HLSA702	Policy and Politics of Health	3
HLSA778	Internship in Public Health	4
HLSA601	Introduction to Health Systems	3
HLSA711	Health Economics and Analysis	3
HLSA772	Healthcare Leadership and Communications	3
HLSA740	Healthcare Strategic Planning and Marketing	3
HLSA786	Capstone Project in Public Health	3
Total Credits		**45**

Public Management (MAMG)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

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Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Courses: PLCY (https://academiccatalog.umd.edu/graduate/courses/plcy/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Optional: Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority: 16 Jan	27 Sep
	Final: 15 May	
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Priority: 16 Jan	27 Sep
	Final: 13 Mar	

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Management, Master of Public Management (M.P.M.) (p. 341)

Public Management, Master of Public Management (M.P.M.)

Non-thesis only: 36 credits required

The Master of Public Management (MPM) policy track is a 36 credit degree program for professionals with at least 5 years of policy and management experience. The program is identical to the MPP program except that students take four fewer general electives and may substitute a policy or management elective for the capstone course required in the MPP program.

Courses are offered throughout the day, but it is sometimes possible to complete the program by taking only courses beginning no earlier than 4:15pm. Students usually finish the program in three years by taking two courses each fall and spring semester, but can finish in as many as five years, or as few as one year by taking four courses in the fall and spring semesters, 1 during the winter semester, and 3 during the summer semester.

Course	Title	Credits
Required courses:		
PLCY688	Topics in Public Policy (PLCY688E - Normative and Political Dimensions of Public Policy)	3
PLCY688	Topics in Public Policy (PLCY688G - Management and Accountability)	3
PLCY640	Microeconomic and Policy Analysis	3
PLCY610	Quantitative Aspects of Public Policy	3
PLCY688	Topics in Public Policy (PLCY688R - Budgeting and Finance)	2
PLCY688	Topics in Public Policy (PLCY688I - Macroeconomics)	2
PLCY688	Topics in Public Policy (PLCY688Y - Practicing Public Policy in the 21st Century)	3
Specialization Requirements		
Select one of the following:		17
Environmental Policy		
Energy Policy		
Federal Acquisition		
International Development Policy		
International Security and Economic Policy		
Management and Leadership		
Non-profit Management and Leadership		
Public Sector Financial Management		
Social Policy		
Education Policy		
Health Policy		
Total Credits		**36**

Public Management (Z004)

Graduate Certificate Program
College: Public Policy

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.publicpolicy.umd.edu

Admissions

This certificate is not currently accepting applications.

Requirements

- Public Management, Post-Baccalaureate Certificate (P.B.C.) (p. 341)

Public Management, Post-Baccalaureate Certificate (P.B.C.)

Course	Title	Credits
Core Requirements		
PLCY689	Public Policy Topics (PLCY689X Performance Management)	3
PLCY698	Selected Topics in Public Affairs (PLCY698T Networks: Leading and Managing Across Sectors)	3
One of the following courses:		3
PLCY670	Public Budgeting & Financial Management	
PLCY688	Topics in Public Policy (PLCY688F State, Local and Nonprofit Financial Management)	
PLCY717	Federal Budgeting: Policy and Process	

PLCY781	International Economic Policy	
Elective		**3**
Any management and leadership course approved by the School of Public Policy. Any course from above may be used if not already used for a core requirement.		
Total Credits		**12**

Public Policy and Law (LMPO)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership, acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

CONTACT

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Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Courses: PLCY **(**https://academiccatalog.umd.edu/graduate/courses/plcy/**)**

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Optional: Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)
- JD application: Law School (JD) Requirements: applicants should check with the University of Maryland Law School (https://www.law.umaryland.edu/). Applicants must apply to the M.P.P. and law programs separately and be accepted by both programs.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority: 16 Jan / Final: 15 May	19 Dec
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Priority: 16 Jan / Final: 13 Mar	27 Sep

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Policy and Law, Master of Public Policy and Juris Doctorate (dual degree) (M.P.P. and J.D.) (p. 342)

Public Policy and Law, Master of Public Policy and Juris Doctorate (dual degree) (M.P.P. and J.D.)

Students are required to complete 114 total credits with 39 credits in Public Policy and 75 credits taken in Law.

The University of Maryland School of Law (located in Baltimore) and the School of Public Policy offer a dual program of studies leading to both the MPP and JD degrees, in less time (often four years) and at less cost than if the degrees were obtained separately. Because they can double-count 9 credits taken at each school towards the other school, students complete 75 (versus 84) credits at the law school and 39 (versus 48) credits in the policy school, thus saving 18 credits.

Candidates must separately apply to the dual degree program in both the law school and the policy school. If admitted by only one program, the student may enroll in that program.

For further discussion of admission and degree requirements, students may consult each school's website.

Course	Title	Credits
Required courses:		
PLCY688	Topics in Public Policy (PLCY688E - Normative and Political Dimensions of Public Policy)	3
PLCY688	Topics in Public Policy (PLCY688G - Management and Accountability)	3
PLCY640	Microeconomic and Policy Analysis	3
PLCY610	Quantitative Aspects of Public Policy	3
PLCY688	Topics in Public Policy (PLCY688I - Macroeconomics)	2
PLCY688	Topics in Public Policy (PLCY688R - Budgeting and Finance)	2
PLCY688	Topics in Public Policy (PLCY688Y - Practicing Public Policy in the 21st Century)	3
PLCY688	Topics in Public Policy (PLCY688T - Team-Based Policy Lab)	3
PLCY699	Selected Topics Public Policy (PLCY699W - Policy Engagement Project)	2
PLCY790	Project Course	3
Remainder of coursework		12
Total Credits		**39**

Public Policy (MAPO)

Graduate Degree Program
College: Public Policy

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

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Website: http://www.publicpolicy.umd.edu

Courses: PLCY **(**https://academiccatalog.umd.edu/graduate/courses/plcy/**)**

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Optional: Graduate Record Examination (GRE) or Graduate Management Admissions Test (GMAT)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationplcy.pdf)

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Priority: 16 Jan	19 Dec
	Final: 15 May	
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Priority: 16 Jan	27 Sep
	Final: 13 Mar	

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Policy, Master of Public Policy (M.P.P.) (p. 343)

Public Policy, Master of Public Policy (M.P.P.)

Non-thesis only: 48 credits required

Most MPP students take 4 courses per semester and finish the program in two years. Students may instead take 1-4 courses each semester and complete the degree in two-five years.

Between the first and second year, and/or during the academic year, most full-time students engage in internships in international, federal, state or local government agencies, non-profit organizations, or private firms that are engaged in the policy process. In addition to offering practical experiences and the opportunity to further develop skills acquired during the first year, these internships provide students with contacts and relationships useful for future projects and job placement.

About 150 students from a wide variety of undergraduate schools and majors, from all parts of the country, and from around the world enter the program each fall. The mean undergraduate grade point average of entering students is 3.6 and GRE scores average in the low to mid 600s.

Course	Title	Credits
Required courses:		
PLCY688	Topics in Public Policy (PLCY688E - Normative and Political Dimensions of Public Policy)	3
PLCY688	Topics in Public Policy (PLCY688G - Management and Accountability)	3
PLCY640	Microeconomic and Policy Analysis	3
PLCY610	Quantitative Aspects of Public Policy	3
PLCY688	Topics in Public Policy (PLCY688I - Macroeconomics)	2
PLCY688	Topics in Public Policy (PLCY688R - Budgeting and Finance)	2
PLCY688	Topics in Public Policy (PLCY688Y - Practicing Public Policy in the 21st Century)	3
PLCY688	Topics in Public Policy (PLCY688T - Team-Based Policy Lab)	3
PLCY699	Selected Topics Public Policy (PLCY699W - Policy Engagement Project)	2
PLCY790	Project Course	3
Specialization Requirements		
Select one of the following:		21
Environmental Policy		
Energy Policy		
Federal Acquisition		
International Development Policy		
International Security and Economic Policy		
Management and Leadership		
Non-profit Management and Leadership		
Public Sector Financial Management		
Social Policy		
Total Credits		**48**

Public Policy and Sustainable Development & Conservation Biology (PPCN)

Graduate Degree Program
College: Public Policy / Computer, Mathematical, and Natural Sciences

*This program is not currently accepting applications. Please visit the our graduate program listing (p. 19) for information on other programs.

Abstract

The School of Public Policy is one of the nation's leading graduate programs devoted to the study of public policy, management and international affairs, with particular expertise in the fields of environmental policy, energy policy, international development, international security and economic policy, health policy, education policy, social policy, non-profit management, public management and leadership,acquisitions, and public finance. The School offers a wide variety of master's programs, joint degree programs, graduate certificate programs, and one of the nation's premier doctorate programs. The School's location just outside of Washington, D.C. attracts a stellar faculty of scholar-practitioners who are experts in the theory and practice of public policy and management and influential participants in the nation's policy-making process. The location and faculty in turn attract outstanding students by providing them, not only an in-depth, rich curriculum, but extensive exposure to and interaction with the real-life world of policy-making, the federal government, the international diplomatic community, state and local governments, and a host of non-governmental and multinational organizations. It is one of the few policy schools to combine state, national and international policy study under one roof, and to take into account policy interests in all sectors of the economy, thus allowing both faculty and students to study the full range of issues in all courses and in all research.

CONTACT

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Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Admissions

This program is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	program not currently accepting applications	program not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Policy and Sustainable Development & Conservation Biology, Master of Public Policy and Master of Science (dual degree) (M.P.P. and M.S.) (p. 345)

Public Policy and Sustainable Development & Conservation Biology, Master of Public Policy and Master of Science (dual degree) (M.P.P. and M.S.)

As environmental problems become more scientifically and politically complex, employers and researchers in the environmental analysis and policy fields are increasingly looking to hire graduates who are well-grounded in the natural and life sciences, the workings of the public, private and non-government sectors, and the key policy analysis tools and concepts. The College of Computer, Mathematical and Natural Sciences and the School of Public Policy offer a dual program of studies leading to both the MPP and the Master of Science in Sustainable Development & Conservation Biology in less time and at less cost than if the degrees were obtained separately. Because they can double-count some credits taken in one program towards the other program, students complete a total of 60 credits in the dual program versus 48 in the policy school and 39 in the M.S. program, thus saving 27 credits. Otherwise the requirements of both degree programs must be met.

Candidates must separately apply to the dual degree program in both the M.S. program and the policy school. If admitted by only one program, the student may enroll in that program.

For further discussion of admission and degree requirements, students may consult each school's website.

Public Sector Finance & Acquisition (Z033)

Graduate Certificate Program
College: Public Policy

CONTACT

Office of Student Affairs
School of Public Policy
2101 Van Munching Hall
7699 Mowatt Lane
College Park, MD 20742
Telephone: 301.405.6331
Fax: 301.403.4675
Email: policy-applications@umd.edu

Website: http://www.publicpolicy.umd.edu

Courses: PLCY **(**https://academiccatalog.umd.edu/graduate/courses/plcy/**)**

Admissions

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	not currently accepting applications	not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	not currently accepting applications	not currently accepting applications

Other Deadlines: Please visit the program website at http://www.publicpolicy.umd.edu

Requirements

- Public Sector Finance & Acquisition, Post-Baccalaureate Certificate (P.B.C.) (p. 345)

Public Sector Finance & Acquisition, Post-Baccalaureate Certificate (P.B.C.)

Course	Title	Credits
Core		
PLCY689	Public Policy Topics (PLCY689A Federal Acquisition: Concepts and Management)	3
PLCY698	Selected Topics in Public Affairs (PLCY698G Government Contracting and Pricing)	3
PLCY689	Public Policy Topics (PLCY689F Current Issues in Federal Acquisition)	3
PLCY711	Public Management and Leadership	3
Electives		**6**
PLCY699	Selected Topics Public Policy (PLCY699E Financial Systems and Controls)	
PLCY717	Federal Budgeting: Policy and Process	
PLCY640	Microeconomic and Policy Analysis	
PLCY752	Managing Differences:Resolving Conflict and Negotiating Agreements	
PLCY753	Advanced Negotiations	
PLCY699	Selected Topics Public Policy (PLCY699G Leadership in Groups and Organizations)	
Total Credits		**18**

Quantitative Finance (BMQF)

ABSTRACT

Maryland Smith's Master of Quantitative Finance program allows you to put your quantitative, technology and problem solving skills to full use as you guide companies toward making strategic financial decisions.

Gain access to cutting-edge analytics resources to refine your programming, data management and global investment skills. Advance your skills under the guidance of expert faculty and with a community of talented peers from diverse academic backgrounds.

Solve complex finance challenges for real companies, participate in case competitions and network with major employers who hire our students.

Contact

Robert H. Smith School of Business
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.2559
Email: smithmasters@umd.edu (masters@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letter of Recommendation (1)
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	May 24, 2022

RESOURCES AND LINKS:

Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Quantitative Finance, Master of Quantitative Finance (M.Q.F.) (p. 346)

Quantitative Finance, Master of Quantitative Finance (M.Q.F.)

36 credits required

Course	Title	Credits
Required courses:		
BUFN610	Financial Management	2
BUFN670	Financial Mathematics	2
BUFN741	Advanced Capital Markets	2
BUFN745	Financial Programming	2
BUFN630	Valuation in Corporate Finance	2
BUFN640	Financial Data Analytics	2
BUFN650	Machine Learning in Finance	2
BUFN660	Derivative Securities	2
Select 20 credits of electives		20
Total Credits		**36**

Radar Signal Processing (Z031)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.norbertwiener.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	not currently accepting applications	not currently accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	not currently accepting applications	not currently accepting applications

Other Deadlines: Please visit the program website at http://www.norbertwiener.umd.edu

Requirements

- Radar Signal Processing, Post-Baccalaureate Certificate (P.B.C.) (p. 346)

Radar Signal Processing, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Real Estate Development (MPRE)

Graduate Degree Program
College: Architecture

This program is not currently accepting applications. Please visit the Master of Real Estate Development (p. 347) (RDEV) program page for existing degree information.

Contact

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Clinical Associate Professor and Director
School of Architecture, Planning & Preservation
Real Estate Development Program
1243 Architecture Building
3835 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.8000
Email: mdaymars@umd.edu

Website: http://www.arch.umd.edu

Admissions

This program is not currently accepting applications. Please visit the Master of Real Estate Development (p. 347) (RDEV) program page for existing degree information.

Requirements

- Real Estate Development, Master of Professional Studies (M.P.S.) (p. 347)

Real Estate Development, Master of Professional Studies (M.P.S.)

This program is not currently accepting applications.

Real Estate Development (RDEV)

Graduate Degree Program
School of Architecture, Planning and Preservation

Abstract

The Graduate Program leading to a Master of Real Estate Development is based in the School of Architecture, Planning & Preservation, but it is NOT a design degree. It was the 6th program in the country to offer a comprehensive business based, but multi-disciplinary, approach to real estate development education. There are now more than 20 of these programs offered across the US that recognize that real estate development in its actual practice is multi-disciplinary and requires weighing the financing and investment options in conjunction with consideration of the construction, design, planning and asset management of real estate. In sum -- Real Estate Development -- is all of the above: Finance Plus!! And education for everyone who has an interest in the regulation, development, acquisition, financing or management of real estate will be more effective if they have completed a comprehensive degree about real estate, and not simply 2 or 3 courses about finance and valuation.

The 33-42 credit MRED program stresses a comprehensive approach to real estate development, broadly defined, and encompasses traditional real estate finance topics but goes on to address the full range of development issues--from property acquisition, to planning and permitting, contract and property law, investment and finance, design and construction, as well as marketing, commercial leasing, property, portfolio and asset management. The program aims to assure that graduates can effectively engage lenders, investors, architects, contractors, lawyers, accountants, and public officials as well as how to bring a project in on time with dynamic marketing and efficient property management thereafter.

The program uses three key teaching/learning approaches:

1. the traditional graduate reading and research mode,

2. the popular case study review and discussion method, and

3. the active learning, or practice method, engaging the professional development community as partners in class and in the field to enliven the concepts presented in the classroom.

All of the instructors for the program are active professionals in the real estate field. Graduates are not only provided foundational real estate knowledge, but are prepared to enter the real estate industry with important skills in business writing, presentation, leadership and negotiation as well as a keen awareness of the MRED Quadruple Bottom Line and ability to develop real estate properties that are: Economically Viable, Environmentally Respectful, Socially Responsible and Beautifully Designed.

The sequence of courses and number of semesters to complete the program can be tailored to the academic preparation and any work experience of each student. There is no requirement for work experience. Students may elect an:

Accelerated Path--12 months (for students with real estate education or extensive experience);
Full time Path--15-18 months (for students not working more than 10 hours a week); or
Part Time Path--24-60 months (for students working 20 hours or more a week).
The program admits up to 30 new students in each of the Fall (late August) and Spring (late January) terms. Students have up to 5 years to complete all their coursework, although the average time for part time students is 24 months, 18 months for full time students.

The program admits up to 30 new students in each of the Fall (late August) and Spring (late January) terms. Students have up to 5 years to complete all their coursework, although the average time for part time students is 24 months, 18 months for full time students.

All real estate (RDEV) courses are offered in the evenings on one night a week, with courses scheduled Mondays through Fridays in the Spring and Fall terms. Some courses are delivered in executive-style workshop format over long weekends. Limited courses are offered evenings in Summer and Winter on more intensive schedules. Electives in other programs may be scheduled late afternoon or on multiple days. Students may use one elective course to take a study abroad course offered by any of the programs in the School, provided the academic advisor verifies sufficient real estate content to the course. Additional reduced fee courses in desirable skills are periodically offered through the Colvin Institute, such as preparation for the LEED exams, ARGUS, Co-Star and REFM Financial Modeling.

While the program is quite flexible, there are some restrictions to consider. Students who are working full time are not permitted to take more than two courses in any one semester. Course offerings in the Winter and Summer term are very limited, and students may not enroll in more than one course in the Winter and two in the Summer. Scholarship funds are not available for Winter, Summer, and Study Abroad courses. Students desiring to follow the accelerated path (4 courses per term) need to request early advising and plan their course sequence carefully

and may not be working even part time. Completion of the degree in 12 months is only guaranteed to be available for students starting in the Fall term and only for those who have real estate finance education or experience.

Financial Assistance

The Program provides scholarship funds to a number of qualified students, both part time and full time, each term. Scholarship determinations are made at the time of application and admission. Scholarships are awarded on a per course basis and commitments are made at the time of admission and apply to the entire program (other than Study Abroad, Summer and Winter courses), subject to academic performance.

The Colvin Institute offers a limited number of administrative positions to full-time MRED students. Contact the Program Director to apply.

Periodically there are named scholarships provided by various real estate organizations or development companies.

In addition, there are work opportunities both on, and off campus, and they are relatively plentiful. Students in the past have been successful in finding part time internships and full-time work with local real estate companies. The MRED student listserv posts openings periodically as they are brought to the attention of the Program by alumni, friends, faculty, and sponsors.

Applicants should inquire as to the availability of funding for the term they are starting. Scholarships are typically for a portion of tuition only, and are paid on a per course basis as a student progresses through the program. Scholarships are available to part time, full time, and accelerated students.

If tuition costs are a major factor in your choice of real estate program, please contact us about financing possibilities. The total cost of the MRED degree is the most competitive in the region, and one of the lowest nationally, with a cost-benefit ratio that is unparalleled. There are also significant University and Colvin Institute resources available for student enrichment activities such as support for competitions, site visits, and attendance at local, regional and national real estate events.

The MRED program is known for sending 6 teams to the Final Four of the international ULI/Hines Competition, and taking first prize twice. It is also known for sending 2 teams to the Final Four of the HUD Innovation in Affordable Housing Competition, and taking first prize once. It should be noted that the HUD Competition is only 5 years old.

Contact

To arrange a visit, phone interview, or for more information, please contact the Program Director, Maria Day-Marshall, at mdaymars@umd.edu. Additional information on case competitions, samples of student work, as well as syllabi and adjunct faculty bios can be found at the MRED Program's Web site (http://arch.umd.edu/rdev/real-estate-development (http://arch.umd.edu/rdev/real-estate-development/)) and the Colvin Institute site at http://colvininstitute.org. For information about our industry supporters and Colvin Institute activities go to http://colvininstitute.org. You will also find the Colvin Institute providing outreach and information at the ICSC in Las Vegas each May, at the ULI or NAIOP National Conference each Fall, and at many local events of Bisnow, ICSC, ULI, CREW, NAIOP, AAREP, and HAND.

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Website: http://www.arch.umd.edu

Courses: RDEV

Relationships: Architecture (ARCH) (p. 51) Historic Preservation (HISP) (p. 233) Urban and Regional Planning and Design (URPD) (p. 408) Robert H. Smith School of Business (MBRE) (https://gradschool.umd.edu/business/mbre/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Skills Assessment: This assessment is not used in determining your admission to the program. Self assessments are used for placing students into the proper sequence of courses once admitted. (This is a section within the online application.)
- Writing Sample: (A writing sample of 3-5 pages in business style writing related to real estate. This can be previous individual academic or professional work. Any confidential information should be redacted.)

Acceptance to the program is on a competitive basis. Applicants are required to have a minimum undergraduate grade point average (GPA) of 3.0 on a 4.0 scale from an accredited University. Applicants who demonstrate a strong interest and aptitude with a GPA below 3.0 may be considered based on recommendations or proven success in the field. Such applicants are admitted provisionally and may be required to do additional course work.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Fall 2022: July 19, 2022	Spring 2022: December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Fall 2022: March 15, 2022	Spring 2022: September 14, 2021

RESOURCES AND LINKS:
Program Website: http://www.arch.umd.edu (http://www.arch.umd.edu/)

Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Real Estate Development, Master of Real Estate Development (M.R.E.D.) (p. 349)

Facilities and Special Resources

The University of Maryland is an exceptional location for the pursuit of graduate studies in the field of real estate development, and graduate students are encouraged to take advantage of the opportunities. The University is eight miles from the incomparable library and research facilities of Washington, D.C. In the nation's capital, MRED graduate students have access to the Library of Congress, as well as the specialized collections of professional associations and international organizations, such as the National Association of Home Builders, the Urban Land Institute, the American Institute of Architects, and the National Building Museum. Access to agencies at all levels of government---municipal, county, state and federal--which regulate various aspects of real estate are all available and engaged with the program.

Close by the University are key historically important and interesting places in the development of U.S. communities, including the 4th settlement in America at Historic St. Mary's City in Southern Maryland, which was the first planned city in America. Just 10 minutes from campus is the 1930s iconic new town (cooperative) of Greenbelt, Maryland, and within 45 minutes are the 1960's new towns of Columbia, Maryland, St. Charles, Maryland and Reston, Virginia. One of the best examples of New Urbanism is the Kentlands development less than 30 minutes away in Gaithersburg, MD. And not to be missed are the major redevelopment and urban living revivals in the Port City of Baltimore and the historic neighborhoods of Anacostia and Columbia Heights in the District of Columbia, as well as the suburbs that are reinventing themselves in the close in suburbs to the District in Northern Virginia and Maryland.

The program is also the home of the Colvin Institute of Real Estate Development, endowed by the late John Colvin and his wife and Karen. The Institute supports the outreach to the industry through a Council of Advisors, as well as various networking and high profile real estate events on and off campus. Also associated with the School is the National Center for Smart Growth Research and Education, which involves faculty and graduate students from several campus units in multi-disciplinary research on the fiscal, environmental and social impacts of alternative development patterns; evaluation of growth management strategies, transportation patterns and planning therefor, as well as technical assistance to state agencies and local jurisdictions.

The program's location in College Park, Maryland, with direct Metro access to downtown Washington, D.C. and easy access up the Baltimore-Washington Parkway to Baltimore City, makes field work, site visits and interaction with ongoing real estate developments and developers one of the signature features of the MRED program.

The MRED Council of Advisors, as well as adjunct faculty who are active professionals in all aspects of real estate development, are eager to engage with students in the program which offers formal and informal occasions for advice about the current trends in the industry as well as the possibility of full- or part- time employment or internships.

There is an active student real estate club, SoRED, and also a strong MRED alumni group who are very effective in helping each other find positions as well as post jobs from where they are for current MRED students to consider. Announcements about full time and intern positions are posted to the MRED list serve frequently. Adjunct faculty and guest speakers also are generally very willing to help students network and connect with employment resources once they have completed their core courses. The School also has a placement officer who is available by appointment to help students in their search.

Real Estate Development, Master of Real Estate Development (M.R.E.D.)

Non-thesis only (capstone project required): 33 credits-42 credits

MRED is a 33-42 credit hour professional masters degree in real estate development. There are 3 core required courses in Development Law, Fundamentals of Finance and the Capstone final course. There are 5 cognate areas from which a course must be taken to fulfill degree requirements.

Electives may be selected in focus areas of: Advanced Finance, Sustainability, Affordable Housing, Historic Preservation and Urban Planning. There are also electives in types of real estate such as retail, hospitality, and leadership and negotiation skills. Electives may also be taken in any of the cognate areas of Construction, Valuation, and Asset Management.

Applicants without education or work experience in real estate, particularly real estate finance, accounting and valuation are admitted subject to adding 3 to 9 credits of additional RDEV course work in the first or second term of their MRED degree program. Students with no background can expect to be subject to the full 9 credits; most applicants have 3 - 6 additional credits to complete.

Admitted Students are required to attend a 2 1/2-day Bootcamp (Assessment and Orientation Program) (Friday night through Sunday afternoon) prior to their first semester of taking RDEV courses.

Students may be required, based on the introductory Assessment sessions or subsequent classwork, to take additional evening or weekend coaching courses/sessions in Excel skills, business writing or oral presentation. Successful completion of all supplemental coaching sessions is required for graduation.

Graduates must achieve a 3.0 GPA in all coursework, including the final capstone course or research project and publicly present their capstone work to a jury in order to be awarded the MRED degree.

Students must meet minimum professional writing and presentation standards, and complete successfully all excel, business writing, and oral presentation and skills non-credit courses or coaching as are offered and required during the period of enrollment. These courses may incur an additional charge paid to the Colvin Institute.

International Students also must test out or successfully complete within two semesters the University English writing courses as determined by the Office of International Student and Scholar Services (ISSS).

The MRED program is highly flexible which allows for tailoring the required core and cognate courses to a student's background and interest, such that a student with a strong background in architecture, law, planning, public policy or finance, could substitute out of the core/cognate course in their area of expertise and add a more advanced course or an unrelated RDEV elective with the advice and approval of the

Director. The course work for the core courses is very intense, and off site visits are required in most courses anywhere from 1 to 3 times per semester some of which are scheduled for weekend hours, and some during working hours in limited instances.

Limited Courses are offered during Summer and Winter terms. Students may take no more than two courses over the Summer terms and one course in Winter term. The maximum number of credits toward the MRED degree that may be taken in Summer/Winter terms is twelve (12). One course (no more than 3 credits) may be credited toward the MRED degree for program approved Study Abroad courses. See the Program Director for details before applying for any Study Abroad course. Certificate students are subject to the same requirements as above, but may not take elective or advanced courses or apply a Study Abroad course to the certificate.

Course	Title	Credits
Required courses:		
RDEV610	Real Property Development Law and Ethics	3
RDEV630	Real Property Finance and Investment	3
RDEV690	Capstone Project: Real Property Feasibility Study	3
Cognate courses:		
RDEV615	Principles, Process and Politics of Planning for Real Property Development	3
RDEV620	Market Analysis for Real Property Development	3
RDEV640	Principles of Urban Design for Real Property Developers	3
RDEV650	Essentials of Design and Construction Management for Development Professionals	3
RDEV660	Commercial Leasing for Real Property Developers	3
Select 9 credits of electives		9
Additional credits [1]		0-9
Total Credits		**33-42**

[1] Up to 9 additional credits may be required if there is not adequate educational background. Students should check with their advisor.

Real Estate Development (Z029)

Graduate Certificate Program
College: Architecture

Abstract

The Graduate Certificate in Real Estate Development is a 12 - 21 credit program, depending on the work experience and academic preparation of the applicant. The Certificate is primarily designed for obtaining the introductory basics of real estate development for those who may not yet have determined to make their career in the field. However, the courses required may be adapted to prior experience or level of expertise for those who are looking for advanced work. The Certificate is comprised of the two fundamental courses for the Master's degree plus two cognate courses, as well as any courses (3 - 9 credits) that would be additional preparation courses as specified in an admission letter. The basic and preparatory courses are all offered to Masters students as well, and Certificate students are not in separate courses for either preparatory courses or for the RDEV (real estate development) courses.

Up to four courses taken as part of the Certificate may be counted toward the MRED degree upon completion of the certificate if the student applies and is accepted into the MRED degree program. Successful completion of the Certificate with grades of B or better assures admission to the MRED program. Up to additional 9 credits of leveling coursework may be required before a Certificate student may move on to the core real estate certificate courses, depending on the background and experience of the applicant.

Students subsequent to admission are subject to three assessments: of Excel Skills, Business Writing and Oral Presentation skills. Students who do not meet minimum standards in the Orientation assessments, or if determined during early coursework that skills are insufficient, may be required to take additional evening or weekend coaching courses in order to meet the Program's Professional Skills Standards.

Generally, Certificate Students take 6 credits (2 courses) per term, and can finish in two terms, if no additional leveling preparatory courses are required. Students required to complete a full 21 credits, can still finish in 15 months by taking classes through two summer sessions as well as 3 spring and fall terms. However, a Certificate student may, if they are not working, take a maximum of four courses per term. There is no guarantee that the four required courses for the Certificate, however, will be offered in each term. There is more information about the courses and teaching methods used for the Graduate Certificate Real Estate Development sequence at the catalogue entry for RDEV -- Real Estate Development. There is also information on all the real estate graduate programs, including dual degrees available with business,l historic preservation, and architecture at the website www.arch.umd.edu/real_estate_development (http://www.arch.umd.edu/real_estate_development/).

Certificate students are not eligible to take elective RDEV courses or the Capstone course prior to admission to the Master's program. Certificate students may, on a space available basis, participate in Study Abroad courses, but not for credit towards the Certificate degree.

Financial Assistance

Financial aid through the University administered federal loan programs is now available for Certificate students. This is an exception to the general rule, and is based on application and approval received from the federal government as to the standards of admission and requirements of the program. Contact the Program Director after application as to any available Program scholarship assistance, which, depending on the term, may or may not be available for Certificate students. Scholarship awards from the Program are never available for Summer and Winter term courses or for Study Abroad.

Contact

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Email: mdaymars@umd.edu

Website: http://www.arch.umd.edu/real-estate-development **(**http://www.arch.umd.edu/real-estate-development/**)**

Courses: RDEV

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Skills Assessment: This assessment is not used in determining your admission to the program. Self assessments are used for placing students into the proper sequence of courses once admitted. (This is a section in the online application.)

Acceptance to the Certificate program is competitive. Applicants are required to have a minimum undergraduate grade point average (GPA) of 3.0 on a 4.0 scale from an accredited University. Applicants who demonstrate a strong interest and aptitude with a GPA below 3.0 may be considered on a case by case basis if they show a strong aptitude and/or experience in the field. Such applicants are admitted provisionally based on meeting grade expectations in the program and likely will be required to take additional courses.

No transfer credits from graduate work in other programs at the University of Maryland, or other academic institutions, are accepted towards the Certificate.

Incoming students are required to attend a two day Bootcamp (Orientation and Assessment Program) on the Saturday and Sunday before the beginning of the term in which they take their first course. Based upon Assessments of Professional Skills, additional coaching sessions on Saturdays or late afternoons (5:00 - 7:00pm) may be required for those who do not meet minimum skills in Excel, Business Writing and Oral Presentation. Fees may be charged for such courses, although currently the Colvin Institute covers the cost. Attendance at the Assessment sessions and any follow-up coaching is required to be awarded the Certificate, although the grading is on a pass/fail basis.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Fall 2019: 26 Jul	18 Dec
	Fall 2020: 24 July	
International Applicants		
F (student) or J (exchange visitor) visas A,E,G,H,I and L visas and immigrants	program not currently accepting applications	program not currently accepting applications

Other Deadlines: Please visit the program website at http://www.arch.umd.edu/real-estate-development (http://www.arch.umd.edu/real-estate-development/)

Requirements

- Real Estate Development, Post-Baccalaureate Certificate (P.B.C.) (p. 351)

Facilities and Special Resources

The Facilities and Special Resources available to RDEV (Master of Real Estate Development students) are generally available to Graduate Certificate students. Although, Certificate students may not participate in supported competitions, and financial aid may be more limited. Certificate students are not eligible to take the Capstone course, without applying and completing the Master's requirements. To read about the extent of the facilities and special resources available please check the catalogue of the RDEV program or the web site at www.arch.umd.edu/real_estate_development (http://www.arch.umd.edu/real_estate_development/)

Real Estate Development, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

A 12 - 21 credit introductory program to real estate development. Recommended for those considering whether to move into the real estate development field full time. Courses may be applied to the Master of Real Estate Development Program, if a student desires to go on to full professional preparation

The 4 required courses of the Certificate are Development Law, Process and Ethics; Fundamentals of Development Finance, and 1 course from two of the following groups: Urban Design, Asset and Property Management, Planning and Entitlements Policy and Practice, and Design and Construction Management. For students without academic preparation in finance, accounting and economics additional leveling courses are required in those areas before proceeding to the required courses. Students may begin the Certificate program in either the Fall or Spring terms. Applications are reviewed and admission decisions are issued on a rolling basis

Waivers of the deadline for domestic applicants may be available depending on the number of applicants already admitted.

Course	Title	Credits
Core Requirements [1]		
RDEV688	Selected Topics in Real Estate Development (RDEV688A - Development Law)	3
RDEV630	Real Property Finance and Investment	3
Select two additional courses from cognate areas in Design, Construction, Asset Management and Planning/Entitlements		6
Total Credits		**12**

[1] Students without finance and real estate education or experience typically take an additional 5-9 credits

Reliability Engineering (ENRE)

Graduate Degree Program

College: Engineering

Abstract

Reliability Engineering is an interdisciplinary program of the Department of Mechanical Engineering. The academic and research programs are based upon the recognition that the performance of a complex system is affected by engineering inputs that begin at conception and extend throughout its lifetime. Students may specialize in Assessment (Root-Cause Failure Analysis, Probabilistic Risk Assessment, Common-Cause Failures); Testing and Operation (Operator Advisory Systems, Human Reliability, Software Reliability); Manufacturing (Statistical Process Control, Improved Manufacturing Methods); Component and Structures Reliability (Microelectronics and Materials); or Electronic Packaging Reliability.

Financial Assistance

Financial assistance is available to highly qualified students in the form of research and teaching assistantships. The most outstanding applicants are offered fellowships. Students seeking financial assistance are asked to submit with their applications a current resume or CV as well as a statement regarding their qualifications and/or past research or teaching experience. Financial assistance is sought for all worthy students.

Contact

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Website: http://www.enme.umd.edu

Courses: ENRE (https://academiccatalog.umd.edu/graduate/courses/enre/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Publications/Presentations

The Program offers graduate study leading to the Master of Science, Professional Master of Engineering (offered through the Office of Advanced Engineering Education), and Doctor of Philosophy degrees and is open to students who have a Bachelor of Science degree in engineering, physics, or mathematics and obtained a GPA of at least 3.0 on a 4.0 scale from accredited programs. An individual plan of graduate study compatible with the student's interest and background is established by the student in consultation with an advisor. In some cases, it may be necessary to require background courses to fulfill prerequisites.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	May 13, 2022	October 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	March 11, 2022	September 24, 2021

RESOURCES AND LINKS:

Program Website: http://www.enme.umd.edu
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Reliability Engineering, Doctor of Philosophy (Ph.D.) (p. 353)
- Reliability Engineering, Master of Science (M.S.) (p. 353)

Facilities and Special Resources

Reliability engineering faculty, researchers, and students leverage state-of-the-art research equipment, technology, and systems to develop new methods, create innovative tools, and find practical solutions to the most pressing societal concerns. More information about our research labs and centers can be found here: https://enme.umd.edu/facilities (https://enme.umd.edu/facilities/).

Reliability Engineering, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

The M.S. degree program offers thesis and non-thesis options. The thesis option requires 24 credit hours of coursework and 6 credits of thesis research. Students who enroll directly in the Ph.D. program or students who transfer into the Ph.D. program from the M.S. program by passing the Ph.D. qualifying examination may obtain a non-thesis M.S. degree upon advancing to doctoral candidacy. The non-thesis option requires 30 credit hours of coursework, a scholarly paper, and presentation. All students must complete the Program Core requirements as well as all of the Graduate School requirements.

The Professional Master of Engineering (M.Eng.) program in Reliability does not require a thesis, but students must complete at least 30 credits of approved coursework.

Course	Title	Credits
Core Requirements		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Principles of Reliability Analysis	3
Thesis or Non-Thesis Requirements		
Select one of the following options:		24
Thesis:		
Select 24 credits of coursework		
ENRE799	Master's Thesis Research (6 credits)	
Non-Thesis:		
Select 30 credits of coursework		
Scholarly paper		
Total Credits		**30**

Reliability Engineering, Doctor of Philosophy (Ph.D.)

Doctoral students compile a program of study with their advisor, which is then submitted to the Graduate Studies Office of the Department of Reliability Engineering for approval. This should be submitted in the first semester of study. Students must complete 36 credits of courses with at least 30 credits at the 600 level or above, including the required courses for the M.S. degree (ENRE600 and ENRE602) with a minimum 3.0 GPA overall.

Advance to Candidacy: After completion of the two core courses and two additional electives with a minimum GPA of 3.5, students must successfully pass a qualifying exam, as well as present a Dissertation Topic Proposal. The proposal should be completed within two semesters of passing the qualifying exam

Post-Candidacy: Complete at least 12 credits of ENRE899 Doctoral Dissertation Research and successfully defend and submit a dissertation on an original research topic.

Course	Title	Credits
Required courses:		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Principles of Reliability Analysis	3
Select 30 credits of additional courses		30
Dissertation Research Requirements		
ENRE899	Doctoral Dissertation Research	12
Total Credits		**48**

Reliability Engineering (online) (MERE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our reliability engineering degree program provides qualified engineers with the tools they will need to better understand the factors that cause components and systems to fail. This interdisciplinary option is offered by the Department of Mechanical Engineering. Students pursuing a reliability engineering masters degree will study topics such as the mechanisms and physics of failure, methods for reliability, maintainability engineering, life cycle costing, and equipment sparing policies.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Email: cgover@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENRE **(**https://academiccatalog.umd.edu/graduate/courses/enre/**)**

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland. For anyone needing these documents, consider applying for a full-time master's program offered on campus (https://gradschool.umd.edu/engineering/meng-campus/).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months for evaluation of foreign credentials. International applicants are advised to review the Graduate School English requirements to learn whether or not the submission of TOEFL or IELTS scores is required.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/application-process (https://mage.umd.edu/application-process/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Reliability Engineering, Master of Engineering (M.Eng.) (p. 354)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Reliability Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Principles of Reliability Analysis	3
Select 24 credits of electives approved by advisor		24
Total Credits		**30**

Reliability Engineering (online) (Z042)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our reliability engineering degree program provides qualified engineers with the tools they will need to better understand the factors that cause components and systems to fail. This interdisciplinary option is offered by the Department of Mechanical Engineering. Students pursuing a reliability engineering masters degree will study topics such as the mechanisms and physics of failure, methods for reliability, maintainability engineering, life cycle costing, and equipment sparing policies.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission.

Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENRE **(**https://academiccatalog.umd.edu/graduate/courses/enre/**)**

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	December 15, 2021

RESOURCES AND LINKS:

Program Website: mage.umd.edu (https://mage.umd.edu/)

Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 355)

Facilities and Special Resources

This program is currently offered 100% online. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Principles of Reliability Analysis	3
Select two additional approved ENRE courses		6
Total Credits		**12**

Reliability Engineering (PMRE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our reliability engineering degree program provides qualified engineers with the tools they will need to better understand the factors that cause components and systems to fail. This interdisciplinary option is offered by the Department of Mechanical Engineering. Students pursuing a reliability engineering masters degree will study topics such as the mechanisms and physics of failure, methods for reliability, maintainability engineering, life cycle costing, and equipment sparing policies.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

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Email: cgover@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENRE **(**https://academiccatalog.umd.edu/graduate/courses/enre/**)**

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Reliability Engineering, Master of Engineering (M.Eng.) (p. 356)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Reliability Engineering (MERE) for more information.

Reliability Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Principles of Reliability Analysis	3
Select 24 credits of electives approved by advisor		24
Total Credits		**30**

Reliability Engineering (Z064)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers

and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our reliability engineering degree program provides qualified engineers with the tools they will need to better understand the factors that cause components and systems to fail. This interdisciplinary option is offered by the Department of Mechanical Engineering. Students pursuing a reliability engineering masters degree will study topics such as the mechanisms and physics of failure, methods for reliability, maintainability engineering, life cycle costing, and equipment sparing policies.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

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Email: cgover@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENRE **(**https://academiccatalog.umd.edu/graduate/courses/enre/**)**

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 357)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

This program is also offered 100% online. Please see Reliability Engineering (Z042) for more information.

Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		
ENRE600	Fundamentals of Failure Mechanisms	3
ENRE602	Principles of Reliability Analysis	3
Select two additional approved ENRE courses		6
Total Credits		**12**

Risk, Compliance, and the Law (Z108)

Graduate Certificate Program
College: Behavioral and Social Sciences

Abstract

The **Graduate Certificate of Professional Studies in Risk, Compliance, and the Law**, offered through the Center of the Study of Business Ethics, Regulation, & Crime, provides post-baccalaureate training and knowledge in the interdisciplinary fields of business law, ethics, criminology, and accounting. This program, along with the Center of the Study of Business Ethics, Regulation, & Crime, is a joint effort between the College of Behavioral and Social Sciences and the Robert H. Smith School of Business.

Financial Assistance

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines (https://fafsa.ed.gov/deadlines.htm).

Contact

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Courses: BERC **(**https://academiccatalog.umd.edu/graduate/courses/berc/**)**

Admissions

This program is not currently accepting applications*

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Not accepting applications	Not accepting applications
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	Not accepting applications	Not accepting applications

Other Deadlines: Please visit the program website at http://riskcert.umd.edu

Requirements

- Risk, Compliance, and the Law, Post-Baccalaureate Certificate (P.B.C.) (p. 358)

Facilities and Special Resources

To serve the needs of working professionals, courses in Risk, Compliance, and the Law Certificate program are currently offered 100% online in a hybrid format where students will be expected to work both individually and in teams to complete course requirements asynchronously, as well as to participate once per week in a synchronous lecture.

Risk, Compliance, and the Law, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Full-time students complete the 12-credit program in one year by taking three credits (one course) in each of the four 12-week terms. A minimum 3.0 GPA is required to maintain good academic progress for graduation. Students are responsible for keeping track of their progress and should review their academic record to ensure accuracy.

Course	Title	Credits
Required courses:		
BERC600	Legal and Regulatory Compliance	3
BERC601	White-Collar Crime and Victimization	3
BERC602	Accounting and Its Uses in the Forensic Process	3
BERC603	Investigative tools and Data Analysis	3
Total Credits		**12**

Robotics Engineering (Z084)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers

and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our program curriculum is designed to build understanding and expertise in robotics design, modeling, control systems, autonomous vehicle planning and perception, machine learning, and human-robot interaction. With a range of technical electives, students pursuing a robotics engineering degree are able to tailor their coursework towards their area of interest in robotics including artificial intelligence, computer vision and perception, space and planetary robotics, robot kinematics and dynamics, control, networked robotic systems, robotics at micro and Nano scale, and rehabilitation robotics.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENPM **(**https://academiccatalog.umd.edu/graduate/courses/enpm/**)**

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Robotics Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 359)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Robotics Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		
ENPM662	Introduction to Robot Modeling	3
ENPM667	Control of Robotic Systems	3

ENPM661	Planning for Autonomous Robots	3
ENPM673	Perception for Autonomous Robots	3
Total Credits		**12**

Robotics Engineering (PMRO)

Graduate Certificate Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our program curriculum is designed to build understanding and expertise in robotics design, modeling, control systems, autonomous vehicle planning and perception, machine learning, and human-robot interaction. With a range of technical electives, students pursuing a robotics engineering degree are able to tailor their coursework towards their area of interest in robotics including artificial intelligence, computer vision and perception, space and planetary robotics, robot kinematics and dynamics, control, networked robotic systems, robotics at micro and Nano scale, and rehabilitation robotics.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENME (https://umd-curr.courseleaf.com/graduate/courses/enme/) ENRE (https://umd-curr.courseleaf.com/graduate/courses/enre/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Robotics Engineering, Master of Engineering (M.Eng.) (p. 361)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Robotics Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses (Take 4 courses):		12
ENPM661	Planning for Autonomous Robots	
ENPM662	Introduction to Robot Modeling	
ENPM667	Control of Robotic Systems	
ENPM673	Perception for Autonomous Robots	
Robotics Programming Elective (Choose at least 1 course):		3
ENPM808	Advanced Topics in Engineering (ENPM808X - Software Development for Robotics)	
ENPM809	Special Topics in Engineering (ENPM809E Python Applications for Robotics)	
ENPM809	Special Topics in Engineering (ENPM809Y Introductory Robot Programming)	
Robotics Electives (Choose at least 2):		6
ENPM808	Advanced Topics in Engineering (ENPM809T Autonomous Robots)	
ENPM640	Rehabilitation Robotics	
ENPM808	Advanced Topics in Engineering (ENPM808F Robot Learning)	
ENPM808	Advanced Topics in Engineering (ENPM808P Manufacturing and Automation)	
ENPM645	Human-Robot Interaction	
ENPM663	Building a Manufacturing Robotic Software System	
Other Electives listed above or approved by advisor (Choose 3 courses. See Plan.))		9
Total Credits		**30**

School Counseling (COSC)

Graduate Degree Program
College: Education

Abstract

The master's level professional entry-level training program in School Counseling prepares students to become school counselors in elementary, middle, and high school settings. School counselors are leaders, advocates, and systemic change agents who provide individual and group counseling to school-aged children, develop and implement comprehensive developmental school counseling programs, and collaborate with all key stakeholders, including classroom teachers, school administrators, parents, and community members, to ensure the academic, personal-social, and college-career development of students. The program is accredited by the Association for Advancing Quality in Educator Preparation and is approved by the Maryland State Department of Education. Therefore, graduates of our School Counseling Program are eligible for certification as school counselors in Maryland and other states. The School Counseling Program at the University of Maryland resides in the number one ranked counseling department (U.S. News and World Report). Our program specializes in preparing professional school counselors who will be *leaders, advocates,* and *systemic change agents* in K-12 urban educational settings.

Financial Assistance

Graduate Assistantships (GAs) are not available for masters level students in the Department. However, there are a number of GAs offered throughout the university, which provide tuition support and a living allowance. Once admitted into the program, students will receive guidance and information on how to secure GAs on campus.

Contact

Shannon Martin
Graduate Assistant
Department of Counseling, Higher Education, and Special Education
3214 Benjamin Building
3942 Campus Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.2858
Email: shmartin@umd.edu (https://academiccatalog.umd.edu/graduate/programs/school-counseling-cosc/shmartin@umd.edu)

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Email: rqshin@umd.edu (cscott18@umd.edu)

Website: http://www.education.umd.edu/CHSE/academics/specialization/SchoolCounseling.html

Courses: EDCP

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Graduate Record Examination (GRE) (**waived for Fall 2022 admission**)
- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationcosc.pdf)

See School Counseling program website for additional information http://www.education.umd.edu/CHSE/admissions/admission_criteria/SCAdmit.html.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	M.Ed. - December 3, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	M.Ed. - December 3, 2021

Other Deadlines: Please visit the program website at http://www.education.umd.edu/CHSE/academics/specialization/SchoolCounseling.html

Requirements

- School Counseling, Master of Education (M.Ed.) (p. 362)

Facilities and Special Resources

All master's, A.G.S., and doctoral students are required to include supervised fieldwork experiences in their degree programs. The CoPE programs have excellent cooperative relationships with on-campus facilities, such as the Counseling Center and Health Center. Fieldwork may also be done at a wide variety of school systems, colleges and universities, and counseling services and mental health agencies in the Baltimore/Washington metropolitan area, or nationally.

In addition to campus and program resources, students utilize the many major research and professional institutions that are easily accessible to the campus. These include the Library of Congress, the National Library of Medicine, the National Institutes of Health, the Institute of Education Sciences, professional associations such as the American Counseling Association, the American Psychological Association, and the National Association of School Psychologists.

School Counseling, Master of Education (M.Ed.)

Non-thesis only: 60 credits required

Professional entry-level program is offered: a Master of Education (M.Ed.) without thesis in School Counseling. Coursework includes one 100-hour practicum and two 300-hour internships in schools in Prince George's County, District of Columbia, Baltimore City, and other urban public school systems. Students also take courses in counseling, school counseling, research methods, and special education. Students are typically full-time and complete the program in two years.

For more information, please contact Shannon Martin (shmartin@umd.edu), Graduate Assistant, School Counseling.

Course	Title	Credits
Required courses:		
EDCP610	Professional Orientation	3
EDCP616	Counseling II: Theory and Practice	3
EDCP618	Course EDCP618 Not Found	3
EDCP622	Human Development in the Counseling Context	3
EDSP600	Issues and Trends in Educating Individuals with Disabilities	3
EDCP665	Family and Social Support Systems	3
EDCP612	Multicultural Issues in Counseling and Personnel Services	3
EDCP621	Practicum in School Counseling	3
EDCP651	Group Counseling in Schools	3
EDCP879	Internship in School Counseling	9
EDCP870	Professional Issues Seminar	3
EDCP611	Career Development Theory and Programs	3
EDCP635	School Consultation I	3
EDCP615	Counseling I: Appraisal	3
EDCP652	Research in Counseling	3
EDCP625	Counseling the Chemically Dependent	3
EDCP797	Capstone Course: Program Planning	3
EDCP620	Introduction to Mental Disorders	3
Students must also submit a scholarly paper		
Total Credits		**60**

School Librarianship (Z114)

Graduate Certificate Program
College: Information Studies

Abstract

The Certificate of Professional Studies in School Librarianship will provide individuals with the coursework required to qualify for certification as a school librarian (library media specialist) in Maryland and in other states with similar certification requirements. The eight required courses, all offered online, may be completed within an 18 month period.

In order to enroll in the certificate program, individuals must have a Master's of Library and Information Science degree or a Master's degree in another field of study and a degree in Education or substantial K-12 teaching experience.

Website: http://ischool.umd.edu

Courses: LBSC (https://academiccatalog.umd.edu/graduate/courses/lbsc/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Supplementary Application
- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Not accepting applications	N/A
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Not accepting applications	N/A

Other Deadlines: Please visit the program website at http://ischool.umd.edu

Requirements

- School Librarianship, Post-Baccalaureate Certificate (P.B.C.) (p. 363)

School Librarianship, Post-Baccalaureate Certificate (P.B.C.)

24 credits required

Course	Title	Credits
Required courses:		
INST650	Facilitating Youth Learning in Formal and Informal Environments	3
INST651	Promoting Rich Learning with Technology	3
LBSC641	Selecting and Evaluating of Resources for Learning	3
LBSC645	Literature and Materials for Children	3
LBSC646	Literature and Materials for Young Adults	3
LBSC741	Seminar in School Library Administration	3
LBSC742	Collaborative Instructional Design and Evaluation	3
Select one of the following: [1]		3
LBSC671	The Lifecycle of Information [1]	
LBSC749	Internship in School Libraries	
Total Credits		**24**

[1] Students with Education degrees and/or teaching experience are required to take LBSC671. Students who do not have Education degrees or teaching experience are required to complete an internship in School Libraries course.

School Psychology (COSP)

Graduate Degree Program
College: Education

Abstract

The graduate programs in Counseling Psychology, School Psychology, and Counselor Education (CoPE) include several distinct areas of specialization that are designed to provide the knowledge and skills needed for practice and scholarship in counseling and related human service professions. These fields are concerned with assisting people individually, in groups, and in organizations to attain their optimal level of personal, social, educational, and career functioning. Graduates are employed in a variety of settings including schools, colleges and universities, mental health agencies, business and industry, government agencies, and other community service and practice facilities. Depending on the specific area of specialization and level of training, program graduates may serve as researchers, educators, supervisors, psychologists, counselors, or program administrators.

Master's level professional entry-level training is offered in the School Counseling program, which prepares students to become school counselors in elementary, middle, and high school settings. School counselors are leaders, advocates, and systemic change agents who provide individual and group counseling to school-aged children, develop and implement comprehensive developmental school counseling programs, and collaborate with all key stakeholders, including classroom teachers, school administrators, parents, and community members, to ensure the academic, personal-social, and college-career development of students.

The Ph.D. degree is offered in two areas of specialization: Counseling Psychology (in collaboration with the Psychology Department) and School Psychology. Doctoral studies prepare students to achieve exceptional competence in the theory and practice of their field; to develop a high level of skills as researchers, educators and administrators; and to assume positions of leadership in relevant settings. Students in the specialization of Counseling Psychology are prepared to work as researchers, educators, psychologists, and supervisors in such settings as academic departments, college and university counseling centers, and community mental health agencies. Doctoral-level school psychologists serve as researchers, university faculty, supervisors, administrators, and advanced level practitioners. Program accreditation within CoPE includes: The School Psychology and Counseling Psychology doctoral programs are accredited by the American Psychological Association (APA). The School Psychology doctoral program is approved by the National Association of School Psychologists (NASP), and is also approved for certification by the Maryland State Department of Education. The School Counseling masters program is approved by the Maryland State Department of Education.

Note that, since 2012, the CoPE graduate programs have been part of a new department, the Department of Counseling, Higher Education, and Special Education. The CoPE programs were previously housed in the Department of Counseling and Personnel Services.

The School Psychology **(**http://www.education.umd.edu/CHSE/academics/specialization/SchoolPsychology.html**)** Program is an APA-accredited, research-intensive Ph.D. program in professional psychology that embodies the scientist-practitioner model. Program graduates pursue academic/research- and practice-oriented careers. Graduates of the Program are eligible for licensure as professional psychologists in Maryland and other states, and are also eligible for the Nationally Certified School Psychologist credential awarded by NASP. Graduates are automatically eligible for Maryland State Dept. of Education certification as a School Psychologist.

Financial Assistance

The Department of Counseling, Higher Education, and Special Education offers graduate research, teaching, and administrative assistantships on a selective basis to doctoral students. The Department also assists its students in finding assistantship placements with a variety of on-campus and off-campus units. In addition, a small number of new Ph.D. students are offered highly selective fellowships funded jointly by the Department and the University.

Contact

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Email: chse-admission@umd.edu (chse-admissions@umd.edu)

Website: https://education.umd.edu/academics/programs/graduate/school-psychology-phd (https://education.umd.edu/academics/programs/graduate/school-psychology-phd/)

Courses: EDCP (https://academiccatalog.umd.edu/graduate/courses/edcp/)

Admissions

General Requirements

- Statement of Purpose: Statement of Purpose needs to be the goals and objectives in relation to those of the program.
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationcosp.pdf)

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants:	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	N/A

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- School Psychology, Advanced Graduate Specialist (A.G.S.) (p. 365)
- School Psychology, Doctor of Philosophy (Ph.D.) (p. 365)
- School Psychology, Master of Arts (M.A.) (p. 365)

Facilities and Special Resources

All master's, A.G.S., and doctoral students are required to include supervised fieldwork experiences in their degree programs. The CoPE programs have excellent cooperative relationships with on-campus facilities, such as the Counseling Center and Health Center. Fieldwork may also be done at a wide variety of school systems, colleges and universities, and counseling services and mental health agencies in the Baltimore/Washington metropolitan area, or nationally.

In addition to campus and program resources, students utilize the many major research and professional institutions that are easily accessible to

the campus. These include the Library of Congress, the National Library of Medicine, the National Institutes of Health, the Institute of Education Sciences, professional associations such as the American Counseling Association, the American Psychological Association, and the National Association of School Psychologists.

School Psychology, Advanced Graduate Specialist (A.G.S.)

60 credits required

Course	Title	Credits
Required courses		
EDCP632	Cognitive Assessment	3
EDCP640	School Psychology Seminar: Overview of the Specialty	3
or EDCP641	School Psychology Seminar: Professional Ethics	
EDMS646	General Linear Models I	3
EDCP618	Course EDCP618 Not Found	1
EDCP635	School Consultation I	3
EDCP743	Developmental Psychopathology	3
EDCP630	School-Based Behavioral Interventions	3
EDCP789	Advanced Topics in Counseling and Personnel Services (EDCP789B)	3
EDCP633	Diagnostic Appraisal of Children I	3
EDCP690	Research in Counseling Psychology I	3
EDCP635	School Consultation I	3
EDCP738	Practicum in Child Assessment	6
EDCP799	Master's Thesis Research	6
EDCP889	Internship in Counseling and Personnel Services	6
Complete 11 additional credits from the following options:		11
EDHD720	Social Development and Socialization Processes	
PSYC789	Special Research Problems (PSYC789R)	
EDCP697	Multicultural Issues in Counseling Psychology	
EDHD721	Cognitive Development and Learning: An Introduction	
EDCP692	Assessment in Counseling Psychology I	
EDMS651	General Linear Models II	
EDCP789	Advanced Topics in Counseling and Personnel Services	
EDCP717	Evaluation of Research in Counseling	
Total Credits		**60**

School Psychology, Master of Arts (M.A.)

Students pursing doctoral degrees may earn the M.A. with thesis within the doctoral program while progressing to the Ph.D. Please contact your advisor for more information.

School Psychology, Doctor of Philosophy (Ph.D.)

The Doctoral program in School Psychology requires the completion of 102 credits, including 12 credits of EDCP899.

Advance to Candidacy: In addition to the course requirements below, students must pass all Comprehensive Exam requirements. Comprehensive Exam requirements include the following:

- Research Review
- Conference Paper/Presentation
- Dissemination of Psychological Science to Practitioner or Lay Audience
- Praxis II School Psychology Exam
- Case Conceptualization Report

Post-Candidacy: Complete a first or co-authored chapter or manuscript submitted for publication with advisor approval. Complete at least 12 credits of EDCP899 Doctoral Dissertation Research in addition to defending and submitting an original dissertation.

Course	Title	Credits
Required courses:		
EDCP889	Internship in Counseling and Personnel Services	3
EDCP614	Counseling Skills: Introduction to Practicum	3
EDMS646	General Linear Models I	3
EDMS651	General Linear Models II	3
EDCP799	Master's Thesis Research	6
EDCP632	Cognitive Assessment	3
EDCP633	Diagnostic Appraisal of Children I	3
EDCP738	Practicum in Child Assessment	6
EDCP630	School-Based Behavioral Interventions	3
EDCP635	School Consultation I	3
EDCP636	School Consultation II	3
EDCP789	Advanced Topics in Counseling and Personnel Services (EDCP789B - Theories and Methods of Intervention)	3
EDCP789	Advanced Topics in Counseling and Personnel Services (EDCP789N - Therapeutic Approaches with Children)	3
EDCP617	Group Counseling	3
EDCP640	School Psychology Seminar: Overview of the Specialty	2
EDCP641	School Psychology Seminar: Professional Ethics	1
EDCP746	Clinical Supervision of Pupil Personnel Services	3
EDCP888	Apprenticeship in Counseling and Personnel Services (EDCP888C - Field Work)	6
EDCP697	Multicultural Issues in Counseling Psychology	3
EDCP717	Evaluation of Research in Counseling	3
EDCP743	Developmental Psychopathology	3
EDHD720	Social Development and Socialization Processes	3
or PSYC611	Advanced Developmental Psychology	
EDHD775	Human Development and Neuroscience	3
or PSYC606	Human Biopsychology	

EDHD721	Cognitive Development and Learning: An Introduction	3
or PSYC607	Advanced Topics in Human-Learning and Cognitive Psychology	
PSYC604	Fundamentals of Social Psychology	3
PSYC610	Historical Viewpoints and Current Theories in Psychology	3
or EDCP789F	Course EDCP789F Not Found	
EDCP692	Assessment in Counseling Psychology I	3
Special Education elective		3
Dissertation Research Requirements		
EDCP899	Doctoral Dissertation Research	12
Total Credits		**102**

School System Leadership (EDUC)

Graduate Degree Program
College: Education

Abstract

The Doctorate of Education (Ed.D.) in School System Leadership is a “Practice Based” doctoral program designed to develop leaders who can develop and lead collaborative and inclusive system improvement initiatives.

The program enrolls cohorts of students who work together over 36 months to identify, investigate and solve real school system problems. The Ed.D. in School System Leadership is approved by the Maryland State Department of Education for Superintendent II certification.

CONTACT

Dr. Margaret McLaughlin
Program Director
Email: mjm@umd.edu

LaTrina Graves
Program Coordinator
Email: lgraves2@umd.edu

Website: https://education.umd.edu/academics/programs/graduate/education-school-system-leadership-edd (https://education.umd.edu/academics/programs/graduate/education-school-system-leadership-edd/)

Courses: EDUC **(**https://academiccatalog.umd.edu/graduate/courses/educ/**)**

Admissions

This is a closed-cohort program. For more information, please visit the program website (https://education.umd.edu/academics/programs/graduate/education-school-system-leadership-edd/).

Requirements

- School System Leadership, Doctor of Education (Ed.D.) (p. 366)

School System Leadership, Doctor of Education (Ed.D.)

Students are required to have a master's degree for both the general program as well as the TESOL and Dual Language Education specialization for admittance. Students applying for the general program are also required to have Administrator I Certification in order to be admitted. The Doctor of Education requires 60 credits, as listed below.

General Program

Course	Title	Credits
Required courses:		
EDUC767	Seminar on School District Leadership	4
EDUC740	Managing Educational Organizations in a Diverse Society	4
EDUC705	Education Policy Making and the School Leader	4
EDUC747	Advanced Seminar on Instructional Improvement for School Leaders	4
EDUC760	The Human Dimension in Administration	4
EDUC770	System Innovation and Transformation (Managing Innovation and Transformation of School Systems)	4
EDUC773	Seminar in School Finance and Resource Management (Seminar in School Finance and Resource Management)	4
Research courses		
EDMS738	Seminar in Special Problems in Measurement (EDMS738F - Assessment and Evaluation for School Leaders)	3
EDUC701	Applied Research and Data Based Decision Making for School Leaders	3
EDUC702	Applied Research Design for Education Leaders	3
Professional courses		
EDUC703	Conducting Library Research for Capstones	2
EDUC704	Introduction to Writing for Education Leaders	2
EDUC888	Applied Apprenticeship in Education	7
Mid-Program Evaluation and Capstone		
EDUC828	Mid-Program Evaluation Portfolio (Mid-Program Evaluation: Portfolio)	6
EDUC829	Doctoral Capstone (Capstone)	6
Total Credits		**60**

Teaching English to Speakers of Other Languages and Dual Language Education Specialization

Course	Title	Credits
Required Courses:		
EDUC767	Seminar on School District Leadership	4
EDUC740	Managing Educational Organizations in a Diverse Society	4
EDUC705	Education Policy Making and the School Leader	4
EDUC770	System Innovation and Transformation	4
Specialization courses		
TLPL740	Language and Education	3

TLPL743	Teaching English Language Learners: Current and Future Research Directions	3
TLPL744	Research Foundations of Second Language Education: Examining Linguistically Diverse Student Learning	3
TLPL688	Special Topics in Education (TLPL688X Teaching for Equity in Bilingual and Language Immersion Programs)	3
Research courses		
EDUC701	Applied Research and Data Based Decision Making for School Leaders	3
EDUC702	Applied Research Design for Education Leaders	3
Additional Research Course		3
Professional courses		
EDUC703	Conducting Library Research for Capstones	2
EDUC704	Introduction to Writing for Education Leaders	2
EDUC888	Applied Apprenticeship in Education	7
Mid-Program Evaluation and Capstone		
EDUC828	Mid-Program Evaluation Portfolio	6
EDUC829	Doctoral Capstone (Capstone)	6
Total Credits		**60**

Scientific Computation (Z014)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

Abstract

The certificate program is designed to give graduate students in other departments an opportunity to study modern computational methods and at the same time give them recognition for their extra efforts.

Website: http://www.amsc.umd.edu

Courses: AMSC (https://academiccatalog.umd.edu/graduate/courses/amsc/)

Admissions

This certificate is only available to students who are enrolled in a graduate degree program at the University of Maryland, College Park campus. Please contact your department for admissions information.

Requirements

- Scientific Computation, Post-Baccalaureate Certificate (P.B.C.) (p. 367)

Scientific Computation, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
AMSC660	Scientific Computing I	3
AMSC661	Scientific Computing II	3
CMSC714	Course CMSC714 Not Found (High Performance Computing Systems)	3
Select one applications course		3
Total Credits		**12**

Second Language Acquisition (SLMA)

Graduate Degree Program
College: Arts and Humanities

Abstract

The M.A. is intended primarily as a two-year program for full-time students. A very limited number of part-time students would also be admitted. It will provide students with rigorous, comprehensive training in the theory and research of second (including foreign) language learning, teaching and testing, and related areas. A major program focus includes preparation for those working, or intending to work, in programs for tertiary students and adults studying less commonly taught languages (LCTLs), e.g., East-Asian and Middle-Eastern languages, and such modern European languages as Spanish, French, Italian and German. Areas of particular faculty expertise include cognitive processes in SLA; language teaching methodology and pedagogy; psycholinguistics; language processing; individual differences in such factors as age, aptitude, and working memory; second language analysis; interlanguage studies; heritage learners; needs analysis; syllabus design; materials writing; learner training; language assessment; program evaluation; second language research methods; task-based language teaching; and uses of technology in language learning and testing.

Financial Assistance

Masters Degree and Certificate students in the College of Arts and Humanities are rarely offered funding. It is expected that students admitted to the SLA M.A. or Certificate Program will come with outside sponsorship.

Contact

Kira Gor, Ph.D.
Director of SLA Program
School of Languages, Literatures, and Cultures
2106E Jimenez Hall
4125 North Library Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.0185
Email: kiragor@umd.edu

Website: http://www.sllc.umd.edu

Courses: SLAA

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- CV/Resume
- Writing Sample

Students may enter the program in the Fall semester only. Prior to admission to the program, applicants must have successfully completed a Bachelors degree from an accredited university in a relevant field, e.g., linguistics, applied linguistics, psychology, foreign languages, applied linguistics, cognitive science, anthropology or education.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	5 Feb

Other Deadlines: Please visit the program website at http://www.sllc.umd.edu

Requirements

- Second Language Acquisition, Master of Arts (M.A.) (p. 368)

Facilities and Special Resources

In addition to the University graduate library, the SLA program offers research facilities and resources to facilitate research and materials development, including a multimedia SLA Lab, the Language House (http://www.languages.umd.edu/lh/), The Center for Innovative Teaching and Learning (http://sllc.umd.edu/citl/), the Office of Information Technology (http://www.oit.umd.edu/), and the Center for Teaching Excellence (http://www.cte.umd.edu/).

Students completing coursework with affiliate faculty in the Departments of Psychology, Communication (http://www.comm.umd.edu/), Linguistics (http://www.ling.umd.edu/), and Education (http://www.education.umd.edu/) as well as the Center for Advanced Study of Languages (http://www.casl.umd.edu/) may have access to their respective resources.

Second Language Acquisition, Master of Arts (M.A.)

Thesis option: 30 credits
Non-thesis option: 30 credits

The M.A. in SLA is a 30-credit program, with two tracks: Plan A, by coursework and thesis, and Plan B, by coursework only. These two tracks are meant to accommodate two slightly different populations, those planning on going on for the Ph.D. at Maryland or elsewhere (Plan A) and those who will be consumers and interpreters rather than producers of research and for whom the M.A. will be a terminal degree (Plan B). A Certificate in SLA will also be offered. The Certificate requires 18 credit hours of course work from the Plan B curriculum.

Course	Title	Credits
Required courses:		
SLAA610	Research and Theories in Second Language Acquisition	3
SLAA611	Fundamentals of Foreign Language Acquisition and Instruction	3
SLAA630	Second Language Testing	3
SLAA640	Psycholinguistics	3
SLAA650	Second Language Analysis	3
SLAA620	Second Language Research Methodologies	3
Thesis or Non-Thesis Requirements		**12**
Thesis:		
Select 6 credits of approved electives		
SLAA799	Master's Thesis Research	
Non-Thesis:		
Select 12 credits of approved electives		
Total Credits		**30**

Second Language Acquisition (SLPH)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Ph.D. program in SLA at the University of Maryland aims to train students to conduct research on second language acquisition processes. It has a strong cognitive focus. The program draws upon the expertise of a distinguished cadre of faculty in the School of Languages, Literatures and Cultures (http://www.languages.umd.edu/), and in affiliate departments such as Human Development, Linguistics (http://ling.umd.edu//); Measurement, Statistics, and Evaluation (http://www.education.umd.edu/EDMS/); Hearing and Speech (http://www.bsos.umd.edu/hesp/); Philosophy (http://www.philosophy.umd.edu/); Psychology (http://www.bsos.umd.edu/psyc/); and Curriculum and Instruction (http://www.education.umd.edu/EDCI/)

Financial Assistance

Most students admitted to the Ph.D. program will be funded, either via graduate or teaching assistantships or via research assistantship on grants and contracts, all providing tuition waiver plus stipend. Some students may receive a Graduate Assistantship from the UMCP-affiliated Center for the Advanced Study of Language (CASL) (http://www.casl.umd.edu/) or the National Foreign Language Center (NFLC (http://www.nflc.org), a unit within the College of Arts and Humanities (ARHU).

Contact

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Director of SLA Program
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4125 North Library Lane
University of Maryland

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Email: kiragor@umd.edu

Website: http://www.sllc.umd.edu

Courses: SLAA (https://academiccatalog.umd.edu/graduate/courses/slaa/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE)
- Writing Sample: Demonstrated evidence of ability and interest in undertaking scholarly research; could be published paper or M.A. thesis.
- CV/Resume
- Description of Research/Work Experience
- Publications/Presentations

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	15 Jan	2 Oct
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	5 Feb	2 Oct

Other Deadlines: Please visit the program website at http://www.sllc.umd.edu

Requirements

- Second Language Acquisition, Doctor of Philosophy (Ph.D.) (p. 369)

Facilities and Special Resources

In addition to the University graduate library, the SLA program offers research facilities and resources to facilitate research and materials development, including a multimedia SLA Lab, the Language House (http://www.languages.umd.edu/lh/), The Center for Innovative Teaching and Learning (http://sllc.umd.edu/citl/), the Office of Information Technology (http://www.oit.umd.edu/), and the Center for Teaching Excellence (http://www.cte.umd.edu/).

Students completing coursework with affiliate faculty in the Departments of Psychology, Communication (http://www.comm.umd.edu/), Linguistics (http://www.ling.umd.edu/), and Education (http://www.education.umd.edu/) as well as the Center for Advanced Study of Languages (http://www.casl.umd.edu/) may have access to their respective resources.

Second Language Acquisition, Doctor of Philosophy (Ph.D.)

Doctoral students are required to take 3 credits of SLAA649 (SLAA649R - Research Critique) within their first year. In addition, students choose two courses from two different specializations for a total of 4 courses. Specializations available include Second Language Learning, Second Language Instruction, Second Language Measurement and Assessment, and Second Language Use. Students are also required to complete 2 courses in quantitative and/or qualitative research methods, as well as 12 credits of SLAA899.

The Ph.D. has 4 areas of specialization: **Second Language Learning, Second Language Instruction, Second Language Measurement and Assessment,** and **Second Language Use**. Students select 2 courses each from 2 of these areas (for a total of 4 courses) and are expected to take 2 additional electives in the area of their proposed dissertation work. In addition, all students are expected to take 2 courses in quantitative and/or qualitative research methods. The 8 courses (total) represent the minimum coursework requirement. Some students may need remedial coursework prior to undertaking their 8 courses, and many will wish to take courses beyond the minimum 8 based on their interests. Additionally, all students are strongly encouraged to take a course in the philosophy of science. Before graduation, all students completing the PhD in Second Language Acquisition must demonstrate three types of experience with non-native language: learning a non-native language, using a non-native language, and teaching a language to non-native speakers of that language. All three types of experience will be verified through official documentation and/or assessment as follows:

1. Language Learning. Students must have spent at least two semesters as a student of a non-native language in a post-secondary classroom environment (6 total credits minimum). Verified through transcript. SLLC will provide this experience for any student who needs it.
2. Language Teaching. Students must have taught a language to non-native speakers of that language for at least 1 semester, or the equivalent of 45 hours. Verified through contract, letter, etc. SLLC will provide this experience for any student who needs it.
3. Language use. Students must show that they are able to communicate in a non-native language at the intermediate-low level on the ACTFL scale through an Oral Proficiency Interview (OPI). Students whose native language is not English will be able to satisfy this requirement through their competency in English. These three requirements do not necessarily have to be met in the same language. Before the PhD dissertation, two qualifying papers are required. Please see the program website (http://www.languages.umd.edu/slaa/) for more details.

Course	Title	Credits
Core Requirements		
SLAA649	Special Topics in Second Language Acquisition (SLAA649R - Research Critique)	3

Complete 2 courses in quantitative and/or qualitative research methods		6
Specialization Requirements		
Select 2 courses each from 2 of these areas		12
Second Language Learning		
Second Language Instruction		
Second Language Measurement and Assessment		
Second Language Use		
Dissertation Research Requirements		
SLAA899	Doctoral Dissertation Research	12
Total Credits		**33**

Second Language Acquisition (Z081)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The M.A. is intended primarily as a two-year program for full-time students. A very limited number of part-time students would also be admitted. It will provide students with rigorous, comprehensive training in the theory and research of second (including foreign) language learning, teaching and testing, and related areas. A major program focus includes preparation for those working, or intending to work, in programs for tertiary students and adults studying less commonly taught languages (LCTLs), e.g., East-Asian and Middle-Eastern languages, and such modern European languages as Spanish, French, Italian and German. Areas of particular faculty expertise include cognitive processes in SLA; language teaching methodology and pedagogy; psycholinguistics; language processing; individual differences in such factors as age, aptitude, and working memory; second language analysis; interlanguage studies; heritage learners; needs analysis; syllabus design; materials writing; learner training; language assessment; program evaluation; second language research methods; task-based language teaching; and uses of technology in language learning and testing.

CONTACT

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Email: sross@umd.edu

Website: http://www.sllc.umd.edu

Courses: SLAA **(**https://academiccatalog.umd.edu/graduate/courses/slaa/**)**

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)
- Graduate Record Examination (GRE)

Students may enter the program in the Fall semester only. Prior to admission to the program, applicants must have successfully completed a Bachelors degree from an accredited university in a relevant field, e.g., linguistics, applied linguistics, psychology, foreign languages, applied linguistics, cognitive science, anthropology or education.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	17 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	4 Feb

Other Deadlines: Please visit the program website at http://www.sllc.umd.edu

Requirements

- Second Language Acquisition, Post-Baccalaureate Certificate (P.B.C.) (p. 370)

Facilities and Special Resources

In addition to the University graduate library, the SLA program offers research facilities and resources to facilitate research and materials development, including a multimedia SLA Lab, the Language House (http://www.languages.umd.edu/lh/), The Center for Innovative Teaching and Learning (http://sllc.umd.edu/citl/), the Office of Information Technology (http://www.oit.umd.edu/), and the Center for Teaching Excellence (http://www.cte.umd.edu/).

Students completing coursework with affiliate faculty in the Departments of Psychology, Communication (http://www.comm.umd.edu/), Linguistics (http://www.ling.umd.edu/), and Education (http://www.education.umd.edu/) as well as the Center for Advanced Study of Languages (http://www.casl.umd.edu/) may have access to their respective resources.

Second Language Acquisition, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Course	Title	Credits
Required courses:		
SLAA610	Research and Theories in Second Language Acquisition	3
SLAA611	Fundamentals of Foreign Language Acquisition and Instruction	3
SLAA620	Second Language Research Methodologies	3
SLAA630	Second Language Testing	3
Select two approved electives		6
Total Credits		**18**

Sociology (SOCY)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Graduate Program in Sociology is designed for students seeking a Ph.D. degree. However, the M.A. option is available to students who either wish to obtain a master's degree while continuing in the Ph.D. program, or who leave the program before finishing the PhD. The graduate program is organized into four specialty areas: Demography, Political Sociology, Social Psychology, and Social Inequality & Mobility.

Typically, about half the students finishing Ph.D. degrees in the Sociology Department work as faculty members at colleges and universities, and about half are working in research, administration, and consulting in federal, state, or private organizations. Our location in the Washington, D.C., area offers an unusual number of full-time research opportunities for our graduates.

Financial Assistance

Financial assistance for graduate students is available through teaching and research assistantships, and for advanced students through part-time instructorships. We also have several special fellowships for outstanding applicants that provide additional support tailored to the applicants needs. All carry a stipend plus tuition remission, and most include health benefits.

Contact

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College Park, MD 20742
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Fax: 301.314.6892
Email: pnc (https://academiccatalog.umd.edu/graduate/programs/sociology-socy/pnc@umd.edu)@umd.edu (gradsoc@umd.edu)

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Website: http://www.socy.umd.edu

Courses: SOCY

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE): Ph.D. only
- CV/Resume
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationsocy.pdf) (Ph.D. only)
- Writing Sample (Ph.D. only): Limited to 35 pages with references, tables, and figures.

Please note, the Master's program is for current University of Maryland undergraduates only. Any UMD applicant needs to have SAT scores of verbal plus math scores totaling at least 1270. In addition he/she subject to an academic audit by the Academic/Departmental Advisor.

Admission to the graduate program is based upon the student's academic record, GRE scores, letters of recommendation, and other information relevant to the applicant's chances of being successful in the program. Although a previous major in Sociology is not required, students entering the graduate program should have had the following in undergraduate courses: mathematics through college algebra, elementary statistics, sociological theory, and sociological research methods. Students who have completed prior graduate coursework in Sociology may petition to waive one or more courses in Social Theory, Statistics, or Research Methods. New graduate students are assigned temporary advisors upon arrival, and are then expected to select a permanent advisor who will direct their dissertation research. For consideration for departmental fellowships or assistantships, applications should be received by the preferred deadlines.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	5 Jan
International Applicants	

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	5 Jan

Other Deadlines: Please visit the program website at http://www.socy.umd.edu

Requirements

- Sociology, Doctor of Philosophy (Ph.D.) (p. 372)
- Sociology, Master of Arts (M.A.) (p. 372)

Facilities and Special Resources

In addition to these programs, the department is closely involved with the following research centers: the Center for Research on Military Organization, the Maryland Population Research Center (MPRC), the Center for Innovation, and the Program for Society and the Environment. Collectively, these centers account for over five million dollars in annual research funding. The Department is also affiliated with an interdisciplinary Joint Program on Survey Methods (JPSM). The campus has excellent computer facilities and computer resources are available to faculty and graduate students.

Sociology, Master of Arts (M.A.)

The graduate program in the Department of Sociology is designed for Ph.D. students. We do not offer a terminal Masters program and we will not accept or enroll students for the single purpose of acquiring a Masters degree. However, doctoral students may obtain a Master of Arts degree during their course of doctoral study by completing 30 credit hours.

Course	Title	Credits
Required courses:		
SOCY620	Development of European and American Sociological Theory	3
SOCY601	Statistics For Sociological Research I	3
SOCY602	Statistics For Sociological Research II	3
SOCY699	Special Social Problems (SOCY699D - Special Social Problems)	3
SOCY699	Special Social Problems (SOCY699C - Special Social Problems)	1
SOCY616	Sociology Pro-Seminar	1
Select one course in proposal development		3
Complete an original research paper in the fourth semester		3
Remainder of coursework		10
Total Credits		**30**

Sociology, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete a total of 56 credits including 12 credits of SOCY899. In addition, students must complete a Second-Year Research Paper and pass two specialty exams.

After completion of the coursework, doctoral students must pass two examinations qualifying them to write their dissertations in the specialties of their choice. Upon the recommendation of the appropriate faculty members, the Department Graduate Committee approves the coursework qualifying students to take the two examinations.

Course	Title	Credits
Required courses:		
SOCY616	Sociology Pro-Seminar	1
SOCY620	Development of European and American Sociological Theory	3
SOCY601	Statistics For Sociological Research I	3
SOCY602	Statistics For Sociological Research II	3
SOCY699	Special Social Problems (SOCY699D - Special Social Problems)	3
SOCY699	Special Social Problems (SOCY699C - Special Social Problems)	1
Select one Social Theory course		3
Select an additional Research Methods course		3
Select one Advanced statistic course or research methods course		3
Select one Statistical Techniques course		3
Specialization Requirements		
Select 18 credits of specialization courses		18
Dissertation Research Requirements		
SOCY899	Doctoral Dissertation Research	12
Total Credits		**56**

Software Engineering (PMES)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Software Engineering program is concerned with developing and maintaining software systems that behave reliably and efficiently, are affordable to develop and maintain, and satisfy all the requirements that customers have defined for them. Our faculty consists of world class researchers and practitioners who apply the latest Software Engineering principles at large projects at NASA, DARPA, Raytheon, and Lockheed Martin. Courses focus on three technical areas—cybersecurity, computer engineering, and systems engineering—preparing students to help solve pressing real-world problems.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate

FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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Maryland Applied Graduate Engineering
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University of Maryland
College Park, MD 20742
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Email: schaplin@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENPM **(**https://academiccatalog.umd.edu/graduate/courses/enpm/**)**

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:

Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Software Engineering, Master of Engineering (M.Eng.) (p. 373)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Software Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses:		
ENPM611	Software Engineering	3
ENPM612	System and Software Requirements	3
ENPM613	Software Design & Implementation	3
ENPM614	Software Testing & Maintenence	3
ENPM696	Reverse Software Engineering	3
ENPM808	Advanced Topics in Engineering (ENPM808E - Managing Software Engineering Projects)	3
Select electives approved by advisor		12
Total Credits		**30**

Software Engineering (Z065)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our programs in Software Engineering program is concerned with developing and maintaining software systems that behave reliably and efficiently, are affordable to develop and maintain, and satisfy all the requirements that customers have defined for them. Our faculty consists of world class researchers and practitioners who apply the latest Software Engineering principles at large projects at NASA, DARPA, Raytheon, and Lockheed Martin. Courses focus on three technical areas—

cybersecurity, computer engineering, and systems engineering—preparing students to help solve pressing real-world problems.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

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University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENPM **(**https://academiccatalog.umd.edu/graduate/courses/enpm/**)**

Admissions

General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Software Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 374)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Software Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://advancedengineering.umd.edu/degree-planning-sheets (https://advancedengineering.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Required courses;		
ENPM611	Software Engineering	3
ENPM612	System and Software Requirements	3
ENPM613	Software Design & Implementation	3
ENPM614	Software Testing & Maintenence	3
Total Credits		**12**

Spanish Language and Literature (SPAP)

Graduate Degree Program

College: Arts and Humanities

Abstract

The Faculty of the Department of Spanish and Portuguese is committed to excellence in teaching and mentoring, along with the production of new knowledge that is the hallmark of a strong department. We are known for our focus on intersections between language, literature, culture, and politics, our community engagement, and our MA track in Hispanic Applied Linguistics. We bridge several intellectual fields across Spain and Spanish America and between North, Central and South America, the Caribbean, and Brazil, as we rethink the specificity of our cultures. The Department has been the home of major Latin American and Spanish literary figures, to include Juan Ramon Jimenez, who taught at the University between 1943 and 1951 and who, after being nominated by the Department, received the Nobel Prize for Literature in 1956. His legacy, as well as that of cultural critic Angel Rama, award-winning poet Jose Emilio Pacheco, award winning writer and Professor Emeritus, Jorge Aguilar Mora, and Professor Emerita, Graciela Palau de Nemes, among others, continues to shape our thought, vision, and mission.

The Department is renowned for its multidisciplinary strengths in Latin American and Lusophone literatures and cultures as well as its faculty research in the areas of the history of ideas, Southern Cone literature, Judeo-Latin American literature, Mexican literature, theater, and performance, Latin American modernismo, colonial and transatlantic discourses, Central American transnational cultures, U.S. Latinidades, Quechua language and indigenous literatures, Caribbean-Archipelagic poetics/politics, salsa and sabor, Brazilian cinema, Lusophone Africa and African diaspora studies, deconstruction of the Cuban Revolution, and contemporary reinscriptions of the nineteenth century.

Faculty members in the area of Spanish literature are recognized for their work in the history of the Spanish language and philology from the Middle Ages to the present, Medieval historiography and women narratives, Golden Age poetics, Cervantes and Quevedo traditions, revisions of the Enlightenment, romanticism (journalism and costumbrismo) and realism (philosophical traditions), modern and postmodern narrative and poetics, as well as representations of the Spanish Civil War and exile, particularly in Latin America.

The Department is also at the forefront of Spanish Applied Linguistics, language teaching pedagogy, language teacher education, language use and identity, social and political issues in foreign language teaching and learning, instructional technology, learner variables and learning disabilities, language for specific purposes, cross-cultural communication, and heritage language learning.

Mission

The Department of Spanish and Portuguese seeks to forge a strong dialogue between, and within, our areas of specialization pertaining to Latin America, Spain, and Portugal. To that end, we offer thorough instruction in the diverse, complex, and globalized literatures, cultures, and linguistics of the Spanish and Portuguese-speaking world. Our students not only develop the critical language skills to communicate in the target language but also gain an understanding of the cultures, politics, histories, and literatures of the communities and national spaces of the Americas, Spain, and Portugal.

Our goal is to foster learning and thought, develop critical perspectives, and promote intellectual growth in our students. We teach across interdisciplinary fields such as literature, film, popular and visual culture, theatre, history, philosophy, critical theory, gender and queer studies, philology, and linguistics in different cultural and geographic contexts. We strive for the creation and discussion of new forms of knowledge and the effective engagement of our students and faculty with the world. We prepare students to become promising professionals in their chosen careers.

Our M.A. and Ph.D. graduates are mentored by our faculty, engage in substantive research projects, and benefit from rigorous training in the teaching skills required by the profession. They are prepared to meet the professional demands of highly competitive academic positions in the United States and Latin America.

Financial Assistance

Financial assistance in the form of fellowships and assistantships is available for qualified applicants.

Contact

Laura Demaría, Ph.D.
Professor & Director of Graduate Studies
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For information regarding the MA in Hispanic Applied Linguistics please contact:

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College Park, MD 20742
Telephone: 301.404.8233
Email: mlacorte@umd.edu
Website: http://sllc.umd.edu/spanish (http://sllc.umd.edu/spanish/)

Courses: SPAN (https://academiccatalog.umd.edu/graduate/courses/span/)

Relationships: American Studies (AMST) (p. 36) Comparative Literature (CMLT) (p. 134) English Language and Literature (ENGL) (p. 182) Second Language Acquisition (SLPH) (p. 367) Theatre and Performance Studies (THPF) (p. 402) Women's Studies (WMST) (p. 413)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s): Minimum 12 credits upper level literature/culture courses.
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- 3 Letters of Recommendation: The letters of recommendation must be in English or notarized translation.
- Writing Sample: A research paper written in Spanish, uploaded to the Upload Requirements section of the application.
- CV/Resume

In addition to Graduate School requirements, candidates must have a bachelor's degree with a major in Spanish Language and Literature, or the equivalent in a related field with near native fluency in the written and spoken language.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	15 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	15 Jan

Other Deadlines: Please visit the program website at http://sllc.umd.edu/spanish (http://sllc.umd.edu/spanish/)

Requirements

- Spanish Language and Literature, Doctor of Philosophy (Ph.D.) (p. 377)
- Spanish Language and Literature, Master of Arts (M.A.) (p. 376)

Facilities and Special Resources

In addition to the resources of the University libraries, students have easy access to the Library of Congress, the Smithsonian Institution and other Washington-based libraries and archives. National Archives-II, located on University grounds, is readily accessible to the Campus community. Dr. Sosnowski is the founder and editor of the literary journal *Hispamérica*. The graduate students publish *Animal de fondo*.

In association with the Latin American Studies Center, the Department promotes original initiatives on Latin American topics. Postdoctoral Fellows and Visiting Professors are an integral part of our academic program. Also the Department hosts the Juan Ramón Jiménez Distinguished Lectures, the José Emilio Pacheco Distinguished Series, the interdisciplinary seminar "Hoy: Interdisciplinary Approaches to the Present", and a series of lectures. In recent years, our faculty has been the recipient of major grants and fellowships from The Rockefeller Foundation, the National Endowment for the Humanities and the John Simon Guggenheim Foundation.

Spanish Language and Literature, Master of Arts (M.A.)

Thesis or Non-thesis option: 30 credits

Students can specialize in either Spanish Literature, Latin American Literature, or Hispanic Applied Linguistics. For either option, students must also pass three comprehensive exams and pass a language exam. All students must submit a scholarly paper in their final semester of the program.

The Department offers three areas of specialization within the 30-credit MA: Spanish literature, Latin American literature, and Hispanic applied linguistics. All areas offer a non-thesis option and a thesis option, and all include a comprehensive examination. A one-credit course in methodology is required of all teaching assistants.

See the website of the Department of Spanish and Portuguese for more details: http://sllc.umd.edu/spanish/graduate (http://sllc.umd.edu/spanish/graduate/).

Spanish Literature track

Course	Title	Credits
Core Requirements		
Linguistics course		3
Literary theory and/or criticism course		3
Non-major literature courses		9
Thesis or Non-Thesis Requirements		
Select one of the following options:		15
Non-Thesis:		
Select 15 credits of Spanish Literature		
Thesis:		
Select 9 credits of Spanish Literature		
SPAN799	Master's Thesis Research	
Total Credits		**30**

LATIN AMERICAN LITERATURE track

Course	Title	Credits
Core Requirements		
Linguistics course		3
Literary theory and/or criticism course		3
Non-major literature courses		9
Thesis or Non-Thesis Requirements		
Select one of the following options:		15
Non-Thesis:		
Select 15 credits of Latin American Literature courses		
Thesis:		
Select 9 credits of Latin American Literature courses		
SPAN799	Master's Thesis Research	
Total Credits		**30**

Hispanic Applied Linguistics Track

Course	Title	Credits
Core Requirements		
Hispanic Applied Linguistics courses		12
Literature courses		9
Thesis or Non-Thesis Options		
Select one of the following options:		9
Non-Thesis:		

SPAN798	Open Seminar	
Select 6 credits of Electives		6
Thesis:		
SPAN799	Master's Thesis Research	
Select 3 credits of Electives		
Total Credits		**36**

Spanish Language and Literature, Doctor of Philosophy (Ph.D.)

The doctoral degree is a research and specialized degree and the Graduate School does not require a fixed number of credit hours. However, the Department of Spanish and Portuguese requires a total of 36 credits. Before admission to candidacy, the student must demonstrate:

1. a thorough knowledge of the literary production in the chosen area (Spanish or Spanish-American Literature);
2. an in-depth knowledge of the field of specialization;
3. proficiency in at least one field of the others Hispanic literatures;
4. a reading knowledge of a language other than Spanish and English, to be used as a research tool in the field of specialization;
5. one course in linguistics, such as 'History of the Spanish Language';
6. a minimum of one course in Literary Theory and/or Criticism;
7. acquaintance with a third literature (e.g. Luso-Brazilian, French, or English); and
8. a background in supporting fields to be used as research tools (e.g. history, philosophy, political science, sociology, or art). Students must pass a comprehensive examination, a translation exam (in a language other than English and Spanish), have their dissertation proposal approved for admission to candidacy, and defend a dissertation.

Doctoral students are required to complete 36 credits of coursework in addition to 12 credits of SPAN899. Students must also pass the comprehensive exam, a language reading exam, and the dissertation proposal and defense.

Course	Title	Credits
Core Requirements		
Select 36 credits of coursework including:		36
Two courses in a secondary area		
A graduate course in the History of the Spanish Language		
A minimum of one course in literary theory and/or criticism		
Dissertation Research Requirements		
SPAN899	Doctoral Dissertation Research	12
Total Credits		**48**

Special Education (EDSP)

Graduate Degree Program
College: Education

Abstract

Graduate programs in special education are designed to prepare highly qualified teachers, to provide graduate level content, and to prepare researchers, teacher educators, and leaders in the field of special education. We offer the following graduate program options:

- M.Ed. in Special Education with Generic Elementary/Middle age based certification
- M.Ed. in Special Education with Generic Elementary/Middle age based and severe disabilities certification
- M.Ed. in Special Education with severe disabilities certification only
- M.Ed. in Specialty Program (30 credits)
- M.A. in Special Education (36 credits)
- Advanced Graduate Specialist Certificate (30 credits beyond the master's degree) (p. 378)
- Ph.D. program

Note that, as of 2012, the EDSP graduate programs are part of a new department, the Department of Counseling, Higher Education, and Special Education. The EDSP degree programs were previously housed in the Department of Special Education.

Financial Assistance

A limited number of fellowships, assistantships and/or grants are available to qualified applicants.

Contacts

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Coordinator
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Email: edspgrad@deans.umd.edu

Website: http://www.education.umd.edu/CHSE/SE_overview.html

Courses: EDSP **(**https://academiccatalog.umd.edu/graduate/courses/edsp/**)**

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- M.A. and Ph.D. admissions requirements (https://gradschool.umd.edu/education/edsp-ma-phd/)
- M.Ed. admissions requirements (https://gradschool.umd.edu/education/edsp-med/)

For the M.Ed. programs, students must submit scores on the Praxis Core Academic Skills for Educators test (meeting the State of Maryland passing scores) prior to admission into the program and have an undergraduate 3.0 GPA. The Master's of Arts program requires a 3.0 undergraduate GPA and the submission of the Miller Analogies Test

or the Graduate Record Examination test scores at or above the 40th percentile rank. The AGS program requires a 3.0 undergraduate GPA, a master's GPA of 3.5, and submission of scores on the MAT, GRE, or Praxis Core Academic Skills for Educators test. Admission to the Ph.D. program requires:

1. Master's degree or equivalent in Special Education or a related field from an accredited institution with a GPA of 3.5 or better;
2. An undergraduate GPA of 3.0 or better;
3. A score on the Graduate Record Exam placing the student at or above the 50th percentile on verbal, quantitative, and analytic subtests;
4. Two years of research or work experience with exceptional populations;
5. Three letters of recommendation from individuals who have direct knowledge of the applicant's academic capabilities, work experience, and professional characteristics;
6. A statement of academic and research goals including intended area of study, research interests, and plans for future employment;
7. Evidence of writing skills shown in the statement of academic and research goals;
8. EDMS Research Methods I or equivalent.

Students pursuing teacher certification in special education are required to take courses required by the Maryland State Department of Education which lead to certification in the State of Maryland. Programs for the Master's specialty program, the AGS, and the Ph.D. are planned individually by the students and advisor to reflect each student's background and goals.

A TOEFL score of 100 is required for international students who are not native speakers of English.

1. GRE for Ph.D., Miller Analogies or GRE for M.A., Praxis Core Academic Skills for Educators for M.Ed., MAT, GRE or Praxis Core Academic Skills for Educators for A.G.S. (at State of Maryland cut scores)
2. Three Letters of Recommendation
3. Statement of Goals
4. Transcripts from all previously attended colleges and universities
5. Interview required for Ph.D. and M.Ed. with teacher certification

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	M.Ed. (with Certification): March 12, 2022
	M.Ed. (without Certification): April 1, 2022
	M.A.or Ph.D.: Dec 15, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	M.Ed. (with Certification): March 15, 2022
	M.Ed. (without Certification): March 11, 2022
	M.A.or Ph.D. Preferred: Dec 15, 2021

RESOURCES AND LINKS:
Program Website: http://www.education.umd.edu/CHSE/SE_overview.html

Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Special Education, Certificate of Advanced Study (C.A.S.) (p. 378)
- Special Education, Doctor of Philosophy (Ph.D.) (p. 380)
- Special Education, Master of Arts (M.A.) (p. 378)
- Special Education, Master of Education (M.Ed.) (p. 379)

Facilities and Special Resources

The Special Education program provides an unparalleled setting for graduate study. The program's proximity to outstanding public schools in Maryland provides students who wish to pursue teacher certification the chance to gain experience with a culturally and linguistically diverse student population in urban, suburban, and rural settings.

Additionally, students pursuing a doctoral degree can have experiences in advocacy and professional organizations, government agencies, including the US Department of Education in addition to the coursework they take at the University.

Special Education, Certificate of Advanced Study (C.A.S.)

The Certificate of Advanced Study (https://academiccatalog.umd.edu/graduate/programs/special-education-z905/) in Special Education is available to students who wish to take graduate courses beyond the master's degree. The minimum number of graduate hours is 60 (of which no more than 30 credits can be applied from another institution). The core of the program consists of special education courses in addition to other coursework within the university as approved by the student's adviser and the special education graduate faculty. The College of Education awards the certificate. http://www.education.umd.edu/CHSE/academics/degree_programs/agsEDSP.html

Special Education, Master of Arts (M.A.)

Thesis option only: 36 credits required

Students enrolled in the master's program in special education may earn the Master of Arts degree which requires a thesis or the Master of Education degree which may or may not include teacher certification.

Students complete the following courses:

Course	Title	Credits
Core Requirements		
EDSP600	Issues and Trends in Educating Individuals with Disabilities	3
EDSP799	Master's Thesis Research	6
Select two of the following:		6
EDMS645	Quantitative Research Methods I	
EDSP670	Single Subject Research Designs	
EDSP671	Qualitative Methodologies in Special Education	
EDSP673	Evaluating Evidence-Based Practices in Special Education	3
or EDSP625	Seminar on Severely Handicapping Conditions	

Remainder of coursework approved by advisor	18
Total Credits	**36**

Special Education, Master of Education (M.Ed.)

All tracks within the Special Education M.Ed. require that students successfully complete a master's seminar paper.

Special Education (Non-Certification)

The following courses are completed on the College Park campus:

Course	Title	Credits
Core Requirements		
EDSP600	Issues and Trends in Educating Individuals with Disabilities	3
Select two of the following:		6
EDMS645	Quantitative Research Methods I	
EDSP670	Single Subject Research Designs	
EDSP671	Qualitative Methodologies in Special Education	
EDSP673	Evaluating Evidence-Based Practices in Special Education	3
or EDSP625	Seminar on Severely Handicapping Conditions	
Remainder of coursework approved by advisor		18
Total Credits		**30**

Elementary/Middle School Special Education (certification)

The following courses are completed on the College Park campus:

Course	Title	Credits
EDSP470	Introduction to Special Education	3
EDSP443	Language and Literacy Acquisition in Children with Disabilities	3
EDSP615	Evaluation and Measurement of Exceptional Children and Youth	3
EDSP616	Reading and Writing Instruction in Special Education I	3
EDSP692	Graduate Internship I: Elementary/Middle Special Education	2
EDSP684	Reading and Writing Instruction in Special Education II	3
EDSP613	Behavior and Classroom Management in Special Education	3
EDSP652	Curriculum and Instruction: Elementary Special Education	3
EDSP687	Family Partnerships in Special Education	3
EDSP695	Graduate Internship II: Elementary/Middle Special Education	6
EDSP690	Teacher Candidate Research Seminar in Special Education	3
EDSP683	Assessment and Instruction in Mathematics in Special Education	3
Total Credits		**38**

Elementary/Middle School and Severe Disabilities (Certification)

The following courses are completed on the College Park campus:

Course	Title	Credits
EDSP470	Introduction to Special Education	3
or EDSP411	Universal Design for Learning	
EDSP613	Behavior and Classroom Management in Special Education	3
EDSP602	Instruction of Students with Severe Disabilities I	3
EDSP443	Language and Literacy Acquisition in Children with Disabilities	3
EDSP652	Curriculum and Instruction: Elementary Special Education	3
EDSP615	Evaluation and Measurement of Exceptional Children and Youth	3
EDSP616	Reading and Writing Instruction in Special Education I	3
EDSP603	Instruction of Students with Physical Disabilities	3
EDSP614	Instruction of Students with Severe Disabilities II	3
EDSP683	Assessment and Instruction in Mathematics in Special Education	3
EDSP692	Graduate Internship I: Elementary/Middle Special Education	2
EDSP684	Reading and Writing Instruction in Special Education II	3
EDSP604	Education of Students with Autism Spectrum Disorder	3
EDSP687	Family Partnerships in Special Education	3
EDSP695	Graduate Internship II: Elementary/Middle Special Education	6
EDSP690	Teacher Candidate Research Seminar in Special Education	3
Total Credits		**50**

Severe Disabilities (certification)

The following courses are completed on the College Park campus:

Course	Title	Credits
EDSP602	Instruction of Students with Severe Disabilities I	3
EDSP604	Education of Students with Autism Spectrum Disorder	3
EDSP625	Seminar on Severely Handicapping Conditions	3
EDSP687	Family Partnerships in Special Education	3
EDSP402	Field Placement: Severe Disabilities I	3
or EDSP411	Universal Design for Learning	
EDSP603	Instruction of Students with Physical Disabilities	3
EDSP606	Advanced Study in Inclusive Practices in The Schools	3
EDSP614	Instruction of Students with Severe Disabilities II	3
EDSP670	Single Subject Research Designs	3
Electives		6
Total Credits		**33**

Severe Disabilities with Focus Autism Spectrum Disorder (Certification)

The following courses are completed off-campus:

Course	Title	Credits
EDSP602	Instruction of Students with Severe Disabilities I	3
EDSP603	Instruction of Students with Physical Disabilities	3
EDSP604	Education of Students with Autism Spectrum Disorder	3
EDSP606	Advanced Study in Inclusive Practices in The Schools	3
EDSP614	Instruction of Students with Severe Disabilities II	3
EDSP687	Family Partnerships in Special Education	3
EDSP690	Teacher Candidate Research Seminar in Special Education	3
EDSP612	Transition Methods and Disability Systems	3
EDSP613	Behavior and Classroom Management in Special Education	3
EDSP670	Single Subject Research Designs	3
or HESP627	Augmentative and Alternative Communication	
EDSP678	Seminar in Special Education ((Technology with ASD))	3
EDSP625	Seminar on Severely Handicapping Conditions	3
Total Credits		**36**

Special Education, Doctor of Philosophy (Ph.D.)

The Doctor of Philosophy (PhD) degree in Special Education prepares researchers, teacher educators, and leaders who will advance the education of children and adults with disabilities. The program is intended for full-time students and requires a minimum of 60 post-Master's credits in courses that address special education issues and trends, policies, current research and practice as well as research methods and design. Doctoral students will, with their advisor, identify a sequence of courses and experiences to advance their knowledge in an area of specialization. Students pursuing the doctoral program in special education must have completed a Master of Arts degree or the Master of Education degree in special education or a related area. Students should consult the Department website on Graduate Programs for more information. https://education.umd.edu/academics/programs/graduate/special-education-phd (https://education.umd.edu/academics/programs/graduate/special-education-phd/)

Advance to Candidacy: Doctoral students are required to complete 60 credits of coursework as well as a Comprehensive Portfolio. The portfolio should include the following:

- CV
- Synthesis Paper
- Evaluation of Research and Scholarship
- Evaluation of Leadership and Professional Knowledge
- At least 3 credits of EDSP898.

Post-Candidacy: Students must complete a minimum of 12 credits of EDSP899 Doctoral Dissertation Research and successfully defend and submit an original dissertation.

Course	Title	Credits
Core Requirements		
Select 5 of the following courses (or other courses with advisor approval):		15
EDSP600	Issues and Trends in Educating Individuals with Disabilities	
EDSP675	Legal and Policy Foundations for Individuals with Disabilities	
EDSP798	Special Problems in Special Education (EDSP798x Special Problems in Special Education)	
EDSP872	Theory and Empirical Design in Educational Research	
EDSP888	Apprenticeship in Special Education	
EDSP670	Single Subject Research Designs	
Research Methodology and Design Courses:		
EDMS646	General Linear Models I	3
EDMS651	General Linear Models II	3
Select three additional courses approved with advisor		9
Remaining Coursework:		
EDSP898	Pre-Candidacy Research	3
Electives		15
Dissertation Research Requirements		
EDSP899	Doctoral Dissertation Research	12
Total Credits		**60**

Special Education (Z905)

Graduate Certificate Program
College: Education

Abstract

The Certificate of Advanced Study in Special Education is available to students who wish to take graduate courses beyond the master's degree. The minimum number of graduate hours is 60 (of which no more than 30 credits can be applied from another institution). The core of the program consists of special education courses in addition to other coursework within the university as approved by the student's adviser and the special education graduate faculty. The College of Education awards the certificate. http://www.education.umd.edu/CHSE/academics/degree_programs/agsEDSP.html

Contact

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Email: cscott18@umd.edu

Website: http://www.education.umd.edu

Courses: EDSP (https://academiccatalog.umd.edu/graduate/courses/edsp/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (2)
- Graduate Record Examination (GRE)
- CV/Resume

Visa Eligibility: This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	June 16, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	March 11, 2022

Other Deadlines: Please visit the program website at http://www.education.umd.edu

Requirements

- Special Education, Certificate of Advanced Study (C.A.S.) (p. 381)

Special Education, Certificate of Advanced Study (C.A.S.)

60 credits required

The candidate for the AGS certificate must have a master's degree or its equivalent earned at the University of Maryland or another accredited institution.

Course	Title	Credits
Required course:		
EDSP600	Issues and Trends in Educating Individuals with Disabilities	3
Select two of the following:		6
EDMS645	Quantitative Research Methods I	
EDSP670	Single Subject Research Designs	
EDSP671	Qualitative Methodologies in Special Education	
EDSP673	Evaluating Evidence-Based Practices in Special Education	3
or EDSP625	Seminar on Severely Handicapping Conditions	
Electives approved with advisor		18
Credits applicable from Master's program approved by advisor		30
Total Credits		**60**

Speech Language Pathology (SPLA)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The M.A. program in Speech-Language Pathology is offered by the Department of Hearing and Speech Sciences. This program is available to post-baccalaureate students who have completed undergraduate pre-requisites in hearing and speech sciences/communication sciences and disorders. The SPLA program is an academically based, clinically oriented program designed primarily to prepare professional Speech-Language Pathologists. While information pertaining to communication disorders comprises the central focus of the degree, education about the normal processes of communication, as well as about research methods, is considered an integral part of the program.

Students completing the program are eligible to obtain the Certificate of Clinical Competence in Audiology (CCC-A) of the American-Speech-Language-Hearing Association, and licensure in the State of Maryland and other states. The program typically takes 2 years of study (5 semesters, including the intervening summer and winter semesters). Students have the option of pursuing a Cultural and Linguistic Diversity Emphasis track as part of their M.A. degree. Additionally, students can concurrently pursue a post-baccalaureate Bilingual Certificate Program in Speech-Language Pathology.

The department also offers two additional graduate degree programs. At the doctoral level, the Ph.D. in Hearing and Speech Sciences (p. 229) is offered, with concentrations in Hearing, Speech or Language (see HESP (p. 229) program code). Students applying to the Ph.D. program can opt to receive an MA in Speech-Language Pathology en route to the final degree. For this M.A-Ph.D. dual degree route, applicants should use the program code HESP when applying. Students who wish to pursue the MA degree and Ph.D. successively should apply to the MA program using the degree code SPLA. Second, a clinical doctorate in Audiology (p. 125) is offered, leading either to an Au.D. degree or a combined Au.D./Ph.D (see CAUD (p. 125)).

Financial Assistance

A limited number of graduate assistantships and fellowships are available through the Department. Assistantships that carry teaching, research or clinical responsibilities are awarded on a competitive basis. Students may also seek assistantships elsewhere on campus (such as through the Dean's office or through other departments) or fellowships sponsored by private foundations (e.g., American Speech-Language-Hearing Foundation). During most years, a limited number of scholarships are offered by Montgomery County Public Schools, which involve a post-graduation commitment to work for the school system.

Contact

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Director of Graduate Studies
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Fax: 301.314.2023
Email: sander22@umd.edu

Website: http://www.hesp.umd.edu

Courses: HESP (https://academiccatalog.umd.edu/graduate/courses/hesp/)

Relationships: Clinical Audiology (CAUD) (p. 125) Hearing and Speech Sciences (HESP) (p. 229) Second Language Acquisition SLPH) (p. 368) Second Language Acquisition (SLMA) (p. 367) Special Education (EDSP) (p. 377)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/umdsupplementaryapplicationcaudsplahespcert.pdf)
- Completion of at least 60% of undergraduate pre-requisite courses prior to application. For a list of pre-requisite courses, please visit here (https://hesp.umd.edu/content/application-faqs/).

Admission to the M.A. program is on a very competitive basis. Each year, the Department receives approximately 250-300 applications for 25 anticipated spaces in the M.A. program in Speech-Language Pathology. Successful M.A. applicants typically have earned at least a 3.5 undergraduate GPA (with 3.7-3.8 being the average), and have strong GRE scores and letters of recommendation and a Resume. In addition to the Graduate School requirements, the Department requires applicants to furnish scores on the Graduate Record Examination. Admission to the M.A. and CAUD programs is solely confined to fall matriculation. All students must finish their undergraduate program-specific prerequisite classes before matriculating in the fall. Prospective applicants should note that decisions on admissions are made in early March. Only full-time students are admitted.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	7 Jan
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	7 Jan

Other Deadlines: Please visit the program website at http://www.hesp.umd.edu

Requirements

- Speech Language Pathology, Master of Arts (M.A.) (p. 382)

Facilities and Special Resources

The Department's facilities include

1) Numerous modern research laboratories equipped to support research in the areas of: acoustic phonetics, psychoacoustics, cochlear implants, infant and adult speech perception, neuropsychology, language disorders, bilingualism, and language development, voice, fluency and electrophysiology.

2) The Hearing and Speech Clinic at UMCP. this clinic serves as the initial practicum site for all students pursuing clinical training. The Clinic includes multiple audiological test suites equipped for diagnostic testing, a complete hearing aid dispensary, a group rehabilitation room, and state-of-the-art equipment for behavioral and electrophysiological diagnostic testing, as well as hearing aid selection and fitting. Ten speech and language diagnostic and therapy rooms are integrated with observation areas; and an on-site language pre-school (LEAP, the Language-Learning Early Advantage Program), also equipped for observation.

All of the clinical and research facilities are potentially available for the conduct of student-directed research projects, or for student participation in faculty-initiated research projects. Additional research and clinical facilities are available in the Washington and Baltimore metropolitan areas. The Library of Congress, the National Library of Medicine and the libraries of various medical schools in the Washington-Baltimore area supplement the University's extensive libraries at College Park.

The Department of Hearing and Speech Sciences participates in the Neuroscience and Cognitive Sciences graduate program (see NACS; https://nacs.umd.edu/), the Comparative and Evolutionary Biology of Hearing Training Grant, and the Maryland Language Science Center (http://languagescience.umd.edu), and has ties to the Center for Advanced Study of Language (CASL); these connections afford students the opportunity to work with faculty in other departments at the University of Maryland, College Park, or at UMB.

Speech Language Pathology, Master of Arts (M.A.)

Thesis or Non-thesis option: 35 credits in addition to Practical Experience

The Department of Hearing and Speech Sciences offers the Master of Arts degree with major emphasis in Speech-Language Pathology with either the thesis or the non-thesis option. The Master's degree is required by national credentialing standards for individuals intending to practice as speech pathologists in schools, hospitals, rehabilitation facilities, hearing and speech centers or in other clinical settings. Academic course work, which includes a minimum of 35 credits, is supplemented by additional credit registrations in supervised clinical practica in the University Speech and Hearing Clinic and in selected outside clinical facilities so that the graduate will meet the academic and practicum

requirements for the Certificate of Clinical Competence (C.C.C.) issued by the American Speech-Language-Hearing Association, and be eligible for licensure in the State of Maryland and other jurisdictions. The Master's degree program is accredited by the Council on Academic Accreditation, the national accrediting agency which oversees graduate programs in Speech-Language Pathology and Audiology. A full description of the Master's degree program is available at our web site, listed below. Students have the option of pursuing a Cultural and Linguistic Diversity Emphasis track as part of their M.A. degree.

Additionally, students can concurrently pursue a post-baccalaureate Bilingual Certificate Program in Speech-Language Pathology.

Course	Title	Credits
Required courses:		
HESP610	Language Disorders in Adults	2
HESP601	Foundations of Scientific Inquiry	1
HESP611	Cognitive Disorders in Adults	2
HESP612	Fluency Disorders	2
HESP620	Speech Production Disorders Across the Lifespan	3
HESP616	Language Disorders in the Pre-school Age	2
HESP624	Voice Disorders	2
HESP625	Dysphagia	2
HESP626	Language disorders in school-aged children and adolescents	2
HESP702	Diagnostic Procedures in Speech-Language Pathology	2
HESP627	Augmentative and Alternative Communication	2
HESP613	Autism Spectrum Disorders	2
HESP602	Advanced Seminar in Neurological Bases of Communication	2
Thesis or Non-Thesis Requirements		
Select one of the following options:		9
Thesis:		
Select 3 credits of electives		
HESP799	Master's Thesis Research	
Non-Thesis:		
Select 7 credits of electives		
HESP638	Research Practicum	
Total Credits		**35**

Student Affairs (HISA)

Graduate Degree Program
College: Education

Abstract

The Student Affairs Concentration is committed to the professional preparation of student affairs educators in higher education environments. The concentration is modeled and directed by the core values of student development, multiculturalism/social justice, leadership, scholarship and research, and ethical practices. We maintain a strong relationship with the Division of Student Affairs at the University of Maryland, College Park, which has a historic commitment to supporting scholar-practitioners. Master's graduates commonly work in settings such as student activities centers, academic advising offices, career services offices, offices of resident life, orientation, leadership programs, and multicultural centers. Doctoral graduates often become graduate faculty and/or senior administrators, directing such offices as academic advising centers, student activities, offices of student life, multicultural centers, assessment and research, learning support services, and career centers. Our location near Washington DC provides students with an abundance of opportunities to work in various higher education institutions, policy organizations, and associations in the area.

Student Affairs is a an area of concentration within The Higher Education, Student Affairs, and International Education (HESI) graduate program. In addition to Student Affairs, HESI programs offers concentrations in Higher Education and International Education Policy. Please only include one area of concentration on your application. Before applying students should familiarize themselves with each concentration area and choose the one that most closely fits their own particular needs and aspirations. The College of Education website (http://www.education.umd.edu/) offers descriptions of all the concentrations, faculty profiles and contact information, and is an essential resource for all applicants.

HESI graduate programs are part of a new department, the Department of Counseling, Higher Education, and Special Education. Previously, Student Affairs was part of the Department of Counseling and Personnel Services and Higher Education and International Education Policy were part of the Department of Education Leadership, Higher Education and International Education. HESI is committed to advancing the positive role education can have in society. Our faculty and students study core facets of the education system; this includes the functioning and impact of colleges and universities, student learning and development in higher education, and the enactment and implementation of K-18 and nonformal education policies in an international context. HESI offerings are characterized by a particular emphasis on social justice, diversity, policy, and system change. Our students and faculty are scholars, practitioners, change agents, and innovative leaders active in universities, as well as in national and international organizations and policy-making bodies. The program is a collaborative community that develops theory, conducts research and translates these to practice, and engages students, educators, and professionals in the advancement of education.

Graduate Degrees Offered: M.A., M.Ed., Ph.D

The Master's program is designed to meet the Council for the Advancement of Standards in Higher Education criteria for Master's programs with emphasis on the college student population and multicultural issues. The Council for the Advancement of Standards (CAS) is a cooperative effort of over 40 professional associations in Student Affairs Administration who have designed standards of preparation and practice for the profession.

Financial Assistance

The Department has a very limited number of merit-based fellowships and graduate assistantships available to students. Fellowships are awarded to doctoral students in March only for the following fall semester. A large number of assistantships are also available throughout campus, and many students regularly find assistantships in other departments and offices on campus. Assistantships are most often awarded in the spring for the following fall semester, but occasionally an assistantship may become available at another time of year.

Both fellowships and assistantships are awarded on a competitive basis. It is to the student's advantage to apply well before the published application deadlines and to submit a complete application package

if they intend to be considered for a fellowship, assistantship, or other form of financial aid. It is a requirement that a student be admitted as a condition of eligibility.

International students' applications are not considered complete and are not reviewed by the Department until they have received clearance from the Office of International Student and Scholar Services (ISSS), which can take additional time. If you need information about ISSS clearance visit the ISSS website at http://www.umd.edu/ies. For more information on financial assistance, see the department web site: http://www.education.umd.edu/chse/admissions/finance (http://www.education.umd.edu/chse/admissions/finance/).

Contact

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Email: chse-admissions@umd.edu

Website: http://www.education.umd.edu/CHSE/HESI_overview.html

Courses: EDCP (https://academiccatalog.umd.edu/graduate/courses/edcp/)

Relationships: Higher Education (HIED) (p. 231) International Education Policy (HIEP) (p. 256)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Description of Research/Work Experience (optional)
- Writing Sample (optional)

SAC admissions brochure (click here) **(**http://education.umd.edu/CHSE/academics/specialization/SAC/inbaskets/16-17/SAC_Admissions_Brochure2017.pdf**).**

Frequently Asked Admissions Related Questions

For any additional questions, please feel free to contact the Student Affairs Concentration Graduate Assistant ***(***mailto:SAgrad-GA@umd.edu***)***

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 3, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 3, 2021

RESOURCES AND LINKS:

Program Website: http://www.education.umd.edu/CHSE/HESI_overview.html
Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Student Affairs, Doctor of Philosophy (Ph.D.) (p. 385)
- Student Affairs, Master of Arts (M.A.) (p. 384)
- Student Affairs, Master of Education (M.Ed.) (p. 385)

Facilities and Special Resources

Faculty and students in the Department work closely with area schools, colleges, universities, associations and other education-related organizations. Extensive resources in the Washington, D.C., area, including international agencies and non-governmental organizations, provide exceptional opportunities for internships, field experiences, and research to enhance formal course experiences.

Student Affairs, Master of Arts (M.A.)

Thesis only: 40 credits required

Course	Title	Credits
Required courses:		
EDCP610	Professional Orientation	3
EDCP614	Counseling Skills: Introduction to Practicum	3
HESI655	Organizational Dimensions of Student Affairs	3
HESI672	Individual and Organizational Assessment in Student Affairs	3
EDCP741	Multicultural Practice in Student Affairs: Self, Education, and Society	3

EDCP798	Special Problems in Counseling and Personnel Services	3
HESI771	The College Student	3
EDCP888	Apprenticeship in Counseling and Personnel Services	1
EDCP888	Apprenticeship in Counseling and Personnel Services (EDCP888A - Apprenticeship in Student Personnel Services)	3
HESI773	Designing Qualitative Research in Counseling and Student Affairs Contexts	3
HESI671	Intergroup Dialogue Facilitation Practicum	3
EDCP799	Master's Thesis Research	6
Elective		3
Total Credits		**40**

Student Affairs, Master of Education (M.Ed.)

Non-thesis only: 40 credits required

Students must also write a seminar paper and pass a comprehensive exam.

The minimum number of credit hours required beyond the bachelor's degree for the M.Ed., is 40. All M.Ed. students must do a seminar paper and a comprehensive examination.

Course	Title	Credits
Required courses:		
EDCP610	Professional Orientation	3
EDCP614	Counseling Skills: Introduction to Practicum	3
HESI655	Organizational Dimensions of Student Affairs	3
HESI672	Individual and Organizational Assessment in Student Affairs	3
EDCP741	Multicultural Practice in Student Affairs: Self, Education, and Society	3
EDCP798	Special Problems in Counseling and Personnel Services	3
HESI771	The College Student	3
EDCP888	Apprenticeship in Counseling and Personnel Services	1
EDCP888	Apprenticeship in Counseling and Personnel Services (EDCP888A - Apprenticeship in Student Personnel Services)	3
HESI773	Designing Qualitative Research in Counseling and Student Affairs Contexts	3
HESI671	Intergroup Dialogue Facilitation Practicum	3
Elective		3
Two Professional Concentration/Focus courses		6
Total Credits		**40**

Student Affairs, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 66 credits beyond the Master's degree including 12 credits of EDCP899, nine credits of electives, and nine credits in a professional concentration. Students can complete a three-credit internship as part of the elective requirement.

Advance to Candidacy: In addition to course requirements, students must successfully pass a comprehensive exam in order to advance to candidacy.

Post-Candidacy: Complete at least 12 credits of EDHI899 doctoral dissertation research as well as successfully defend and submit an original dissertation.

Course	Title	Credits
Required courses:		
EDHI750	International Higher Education	3
EDCP774	Advanced Seminar in Theories of College Student Development	3
EDCP775	Facilitating Student Learning in Higher Education	3
EDCP776	Social Justice in Student Affairs and Higher Education	3
EDCP870	Professional Issues Seminar	3
EDCP871	Student Affairs Doctoral Capstone Seminar	3
EDHI672	Modes of Inquiry in Education Research	3
EDCP742	Examining College Environments and Outcomes	3
EDCP772	Research in Student Affairs	3
HESI773	Designing Qualitative Research in Counseling and Student Affairs Contexts	3
Quantitative Methods course		3
Advanced Research Methods/Methodology course		3
Electives		9
Specialization Requirements		
Select nine credits in a professional concentration		9
Dissertation Research Requirements		
EDCP899	Doctoral Dissertation Research	12
Total Credits		**66**

Supply Chain Management (BMSC)

ABSTRACT

Maryland Smith's Master of Science in Supply Chain Management program gives you the skills needed to efficiently manage the flow of goods from the beginning to end phases of a supply chain.

- Refine your problem-solving, analytical and communication skills as you simulate real supply chain scenarios.
- Use cutting-edge tools, including blockchain technology and SAS, to identify trends, forecast consumer behavior and improve operations.
- Position yourself to earn valuable credentials that will help you stand out in the job market, such as the Lean Six Sigma Yellow Belt and APICS certifications.

Financial aid is available to qualified students in the form of fellowships, graduate assistantships, and scholarships.

Contact

MBA/MS Admissions
2303 Van Munching Hall
7699 Mowatt Lane
University of Maryland

College Park, MD 20742
Telephone: 301.405.2559
Email: smithmasters@umd.edu (ms_info@rhsmith.umd.edu)

Website: http://www.rhsmith.umd.edu

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- One letter of recommendation
- Graduate Management Admissions Test (GMAT) or Graduate Record Examination (GRE) (either test is encouraged to be submitted but not required)
- CV/Resume

APPLICATION DEADLINES

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	August 1, 2022
International Applicants	
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	May 24, 2022

RESOURCES AND LINKS:

Other Deadlines: rhsmith.umd.edu/apply (https://www.rhsmith.umd.edu/apply/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Supply Chain Management, Master of Science (M.S.) (p. 386)

Facilities and Special Resources

The Office of Career Services (OCS) provides dedicated, professional support to help students launch their careers. The center links students directly to recruiters through a variety of services, including on- and off-campus recruitment and the online resume database. The OCS also participates in regional and national career forums and job fairs.

The Smith School is located in the Baltimore/Washington, D.C./Northern Virginia corridor. This region offers one of the highest concentrations of culture, diversity, and career opportunities in the country.

Supply Chain Management, Master of Science (M.S.)

Non-thesis only: 30 credits

The MS in Supply Chain Management program will prepare you to discover emerging opportunities and lead innovation on a global scale. Whether you're a recent graduate with an interest in how goods move around the world or a manager who would like to broaden your understanding of the global supply chain, our curriculum will prepare you for new and growing career options in this dynamic industry.

Course	Title	Credits
Required courses:		
BULM734	Assessing and Managing Supply Chain Risks	2
BULM710	Data Driven Decision Making I	2
BULM711	Data Driven Decision Making II	2
BULM750	Lean Sigma for Supply Chain I	2
BULM751	Lean Sigma for the Supply Chain II	2
BULM731	Technology Applications in Supply Chain Management	2
BULM742	Global Supply Chain Resources Planning	2
BULM735	Project Management in Dynamic Environments	2
BULM754	Global Transportation Management	2
BULM756	Supply Chain Strategy	2
BULM721	Global Supply Chain Management	2
BULM700	Business Fundamentals for Supply Chain Managers I	2
BULM701	Business Fundamentals for Supply Chain Managers II	2
BULM732	Networks and Influence	2
BULM724	Negotiations in Supply Chain Management	2
Total Credits		**30**

Survey and Data Science (online) (MPDS)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Joint Program in Survey Methodology (JPSM) blends together faculty with diverse disciplinary backgrounds all devoted to teaching state-of-the-art practices in the statistical and methodological aspects of surveys and data. The program's faculty primarily come from the University of Maryland, University of Michigan and Westat, supplemented by instructors from a number of federal statistical agencies. Many of these faculty are leading researchers and statisticians in the field of survey methodology, thereby providing an unparalleled educational experience to the students. JPSM's offerings include onsite PhD and Master's degrees as well as online Certificates and a Professional Master's degree.

Contact

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Joint Program in Survey Methodology
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College Park, MD 20742
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Email: jodywill@umd.edu

Website: https://jpsm.umd.edu (https://jpsm.umd.edu/)

Courses: SURV (https://academiccatalog.umd.edu/graduate/courses/surv/)

Relationships: Intermediate Survey Methodology (Z011) (https://academiccatalog.umd.edu/graduate/programs/survey-methodology-z011/) Survey Methodology (SURV) (p. 388) Survey Statistics (Z010) (p. 389)

Admissions

General Requirements

- Statement of Purpose: Complete a one-page essay describing relevant work experience, interest in survey and/or data science, and expected benefits of enrolling in this degree program. (Uploaded to the Statement of Purpose in the application.)
- Transcript(s): Should show previous coursework or knowledge in mathematical/applied statistics demonstrated by completion of 6 credits of applied statistical methods courses covering content from probability theory through basic regression techniques (including both OLS and logistic regression)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmpds.pdf)
- Supplementary Application Two: Prerequisites

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Applicants must have earned a four-year baccalaureate degree from a regionally accredited U.S. institution, or an equivalent degree from a non-U.S. institution. Applicants must have earned a 3.0 GPA (on a 4.0 scale) in all prior undergraduate and graduate coursework.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	August 19, 2022	January 14, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	August 19, 2022	January 14, 2022

RESOURCES AND LINKS:

Program Website: http://jointprogram.umd.edu/
Application Process: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Requirements

- Survey and Data Science, Master of Professional Studies (M.P.S.) (p. 387)

Facilities and Special Resources

Training will be provided by permanent and adjunct faculty in the University of Maryland's Joint Program in Survey Methodology. Online lectures will be conducted via accessible video conference systems and Webinar tools.

Students will be instructed that to fully participate, they will need to purchase a webcam and headset with a microphone, and have a reliable computer and Internet access. Recorded lectures will be posted online at announced times and will be available online at any time thereafter during the course. Weekly discussions or help sessions will be held at scheduled, fixed times once per week.

As officially admitted students to the University of Maryland, students in this program will have access to all University resources that are accessible in the online environment. Students in online programs are assessed an online student services mandatory fee which supports access to these University resources.

Survey and Data Science, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits required

The online *International Master of Professional Studies in Survey and Data Science* will provide post-baccalaureate training for individuals interested in broadening their knowledge and understanding of the emerging field of data science, the conduct of sample surveys, practical applications of data analysis and survey methodology, and data management, along with the skills needed to communicate results.

Survey methodology, which is already an interdisciplinary field drawing upon statistics, sociology, economics, political science, informatics, public health (e.g., physical measures taken on respondents), and the geographic sciences (e.g., geographic information systems), is now intersecting with the big data world. As public and private organizations are increasingly combining various data sources, including survey data, for the purpose of decision making, the need for professional development in data generation, quality and analysis is on the rise. The online environment is convenient for working professionals who cannot easily travel to a traditional campus. In addition, courses will be shared with our international partners, providing a rich perspective to class discussions.

Course	Title	Credits
Required course		
SURV400	Fundamentals of Survey and Data Science	3
Data Generating Processes (choose 4 credits)		4
Data Curation and Storage (choose one course)		3
Data Analysis (choose 6 credits)		6
Data Output/Access (choose 3 credits)		3
Electives		11
Total Credits		**30**

Survey and Data Science (SURV)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The Survey and Data Science PhD Program blends together faculty with diverse disciplinary backgrounds, all devoted to teaching state-of-the-art practices in the statistical and methodological aspects of surveys. The program's faculty come primarily from the University of Maryland, University of Michigan, and Westat, supplemented by instructors from a number of federal statistical agencies.

Both the Master of Science (program code: SUDS (https://academiccatalog.umd.edu/graduate/programs/survey-data-science-suds/)) and PhD in Survey and Data Science degree programs have three areas of concentration: Statistical Science , Social and Psychological Science and Data Science.

The **statistical science** area of concentration is designed for students who wish to specialize in areas such as sample design, estimation in complex samples, variance estimation, statistical measurement error models, and statistical adjustments for missing data.

The **social science** area of concentration is designed for students who wish to specialize in areas such as questionnaire design, design of interviewing systems, computer assistance in data collection, effects of mode of data collection, cognitive psychological insights into survey measurement, and efforts to reduce various nonsampling errors in data collection.

The **data science** area of concentration is designed for students who wish to specialize in the more computational aspects of survey methodology and research involving "big data," including data visualization, management and analysis of large and messy data sets, human-computer interaction in survey research, and machine learning algorithms.

The three areas of specialization share a set of courses in the core curriculum (https://jpsm.umd.edu/graduate/masters-sample-curricula/), including a two term survey practicum, a course in data collection methods, two terms of statistical methods, a two term course in total survey quality, and a survey design seminar.

Financial Assistance

Financial assistance is available in the form of competitive fellowships and graduate assistantships for teaching or research.

Fellowships in Support of Diversity and Inclusion (https://jpsm.umd.edu/graduate/phd-admissions/): Financial support option for Ph.D. students only. If you're interested in applying for the Fellowships in Support of Diversity and Inclusion in the Behavioral and Social Sciences (2017-18), please be sure to upload your materials under "4. Supplementary Application Two" when submitting your online admissions application.

Contact

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Courses: SURV (https://academiccatalog.umd.edu/graduate/courses/surv/)

Keywords
Social Science Concentration: Questionnaire Design, Social and Cognitive Foundations of Survey Measurement, Analysis of Complex Data, Survey Management. Statistical Science Concentration: Statistical Methods, Topics in Sampling, Inference from Complex Surveys, Probability Theory, Mathematical Statistics, Data Science Concentration: Big Data, Data Visualization, Human- computer interaction in survey research, machine learning algorithms, analysis of large and messy data sets.

Relationships: Intermediate Survey Methodology (Z011) **(**https://academiccatalog.umd.edu/graduate/programs/survey-methodology-z011/**)** Survey and Data Science (online) (MPDS) **(**p. 386**)** Survey Statistics (Z010) **(**p. 389**)**

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Supplemental Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationsurv.pdf)

Applicants to the M.S. program are expected to hold a baccalaureate degree from a regionally accredited institution with a minimum of a 'B' average. Post-baccalaureate coursework and relevant work experience will also be used in the application evaluation. Entry to the statistical science concentration requires three undergraduate courses in calculus, one in linear algebra, and one in statistics. Entry to the social science concentration requires two undergraduate quantitative courses, at least one of which is in statistics, and at least two undergraduate courses in the social sciences. Entry to the data science concentration requires some background in computer science, with a minimum of two semesters of programming coursework, and also at least one semester of statistics.

Applicants to the Ph.D. program are expected to have a graduate degree in some field (such as statistics or psychology) that is related to survey methodology. Applicants must also demonstrate an appropriate quantitative background.

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 14, 2022 (best consideration)
	January 27, 2022 (final)
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 14, 2022 (best consideration)
	January 27, 2022 (final)

Other Deadlines: Please visit the program website at http://www.jpsm.umd.edu

Requirements

- Survey and Data Science, Doctor of Philosophy (Ph.D.) (p. 389)

Facilities and Special Resources

SURV has the goal of offering training to all qualified students, regardless of the employment sector of interest to them. Several features of the program are designed with the working student in mind. Many class times are tailored to be compatible with the work day; a 12-month curriculum offers core courses throughout the year; and research experience requirements are integrated with work activities.

Courses have been offered at a Federal agency facility located in Washington, D.C. and interactive 2-way audio/video transmission equipment is used to transmit some courses between the College Park campus and the Ann Arbor campus of the University of Michigan,also - between College Park and the Census headquarters in Suitland, MD.

Survey and Data Science, Doctor of Philosophy (Ph.D.)

Students must participate in the Ph.D. seminar for four semesters by enrolling in SURV829 for a total of 12 credits. Students must also complete 12 credits of SURV899.

There are five major requirements for the Ph.D. Students must pass a qualifying examination (normally at the end of their first year) and a comprehensive examination (normally at the end of their second year). They must participate in the Ph.D. seminar for four semesters. They must meet a residency requirement which consists of spending at least two days per week at JPSM for a period of three semesters. Finally, they must complete a dissertation.

Course	Title	Credits
SURV829	Doctoral Research Seminar in Survey Methodology (participate for four semesters)	12
Dissertation Research Requirements		
SURV899	Doctoral Dissertation Research	12
Total Credits		**24**

Survey Statistics, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
SURV400	Fundamentals of Survey and Data Science	3
SURV626	Sampling	2
SURV742	Inference from Complex Surveys	2
Remainder of coursework:		5
Total Credits		**12**

Sustainable Development and Conservation Biology (CONS)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

This program is not currently accepting applications. Please visit our graduate program listing (p. 19) for information on other programs.

Abstract

The principal objective of the CONS Program is to provide graduate training in Sustainable Development and Conservation Biology. CONS is an interdisciplinary and experiential approach to the problems of biological conservation in relation to economic development necessary to meet human needs.

The primary goals of the CONS program are:

1. to provide students with the knowledge and problem-solving skills necessary to research and communicate solutions to global environmental issues;
2. to expand the reach of biodiversity conservation and increasing sustainability;
3. to produce leaders and decision-makers in conservation science that are employed by academia, in government, or non-governmental agencies (NGOs); and
4. to provide a service role to the state of Maryland, the nation, local communities, and national and international NGOs and government agencies.

Specifically the program's objectives are to: provide broad, multidisciplinary training in the core areas of biological conservation, resource economics, and policy analysis; and explicitly link the conflicting topics of sound conservation of natural resources with sustainable development to meet human needs.

CONS graduates are well-prepared to address conservation issues for employers in the private sector and in local, state and national government posts; and to enter Ph.D. programs for further, specialized training.

CONS offers a dual-degree program (PPCN) with the School of Public Policy, wherein students receive both Master of Science and Master of Public Policy degrees. For more information on our degree programs and academic requirements, please see our website at http://cons.umd.edu/cons (http://cons.umd.edu/cons/)

Financial Assistance

Students applying to the Program may be nominated for graduate fellowships or may be supported by teaching or graduate assistantships. Fellowship and assistantship offers are made on the basis of past academic performance, financial need, and potential to contribute to the program.

Contact

Karen Lips, Ph.D.
Director of Graduate Studies
Department of Biology
1201 Biology-Psychology Building
4094 Campus Drive
University of Maryland
College Park, MD 20742
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Email: consoffice@umd.edu

Website: http://cons.umd.edu/cons (http://cons.umd.edu/cons/)

Keywords: Inter-disciplinary Training in Ecology, Resource Economics, Public Policy issues and Problem Solving related to Conservation of Biodiversity and the Continued Functioning of Natural Systems.

Relationships: Biological Sciences (BISI) (p. 83) Marine, Estuarine, and Environmental Sciences (MEES) (p. 278)

Admissions

This program is not currently accepting applications.

Requirements

- Sustainable Development and Conservation Biology, Master of Science (M.S.) (p. 390)

Facilities and Special Resources

The program is housed within the Department of Biology but is campus-wide in scope. We have strong connections with the School of Public Policy because ~30% of CONS students are enrolled in the dual degree PPCN program. We have strong connections with AREC because CONS students take a required course in natural resource economics. All CONS students complete an internship - either in a research lab, with an NGO, or with an agency - either in the DC area or further abroad. All CONS students select a faculty advisor relevant to the topic of their scholarly paper, which results in many interactions with environmental faculty in Anthropology, Entomology, Environmental Science & Technology, Latin American Studies, MEES, Public Policy, Plant Sciences and Landscape Architecture, and other departments.

Sustainable Development and Conservation Biology, Master of Science (M.S.)

This Master of Science Program was initiated in 1991 to provide new training and educational emphasis in the areas of sustainable development and conservation biology. The program applies an interdisciplinary and experiential approach to the challenges of biological conservation in relation to the economic development necessary to meet human needs. It includes four components:

1. core courses in the areas of ecology and conservation biology, resource economics, public policy, and multi-disciplinary problem solving;
2. elective courses from a wide array of disciplines;
3. an internship experience relevant to the student's career interests;
4. a Scholarly Paper - a rigorous, quantitative analysis of an Environmental Problem that synthesizes the student's coursework, internship experience, and career interests.

Course requirements for the program total 39 credits. This is intended to be a two-year program. Please contact the department for more information.

Systems Engineering (ENSE)

Graduate Degree Program
College: Engineering

Abstract

Students in the broadly-based, cross-disciplinary Master of Science in Systems Engineering (ENSE) program at ISR benefit both academically and professionally by:

- Being exposed to a wide range of systems engineering principles and software tools tailored toward support for visual modeling of systems, requirements engineering, system-level modeling, optimization and trade-off analysis, and human factors engineering.
- Becoming familiar with the financial and management issues associated with complex engineering systems.
- Acquiring a deep understanding of one particular application area.
- Becoming familiar for opportunities for leadership within the systems engineering profession.
- Designed with substantial industry input, the ENSE curriculum represents the University of Maryland's first multi-college graduate degree program involving the A. James Clark School of Engineering.

In addition to the technical management of systems projects, the ENSE program covers a wide range of topics, from systems definition, requirements and specifications, to systems design, implementation, and operation. Students specialize in one technical area, selected from computer and software systems, communication and networking systems, signal processing systems, control systems, manufacturing systems, operations research, transportation systems, and robotics. The ENSE program draws upon the extensive engineering, computer science and management experience of the of University of Maryland faculty. The program makes optimum use of the university's advanced facilities, including extensive libraries of numerical, symbolic, and visualization software, engineering workstations, and wireless communication networks.

Financial Assistance

Prospective and current students may seek support for their studies through graduate research assistantships with ISR faculty or graduate fellowships. Students currently working in industry, the military, or the government, who plan to pursue their graduate studies part-time, might ask their employers about tuition assistance. All applicants are encouraged to explore sources of external funding; a number of

comprehensive Internet sites, such as fastweb.com, offer detailed information and application instructions.

Contact

Master of Science in Systems Engineering (ENSE) Program
Institute for Systems Research
2175 A.V. Williams Building
8223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.4419
Fax: 301.314.9920
Email: jmaccart@umd.edu

Website: http://www.isr.umd.edu/education/systems-engineering-education (http://www.isr.umd.edu/education/systems-engineering-education/)

Courses: ENSE (https://academiccatalog.umd.edu/graduate/courses/ense/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Graduate Record Examination (GRE)
- 3 Letters of Recommendation
- CV/Resume

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	March 15, 2022	September 30, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	February 1, 2022	September 30, 2021

RESOURCES AND LINKS:

Program Website: http://www.isr.umd.edu/education/systems-engineering-education (http://www.isr.umd.edu/education/systems-engineering-education/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Systems Engineering, Master of Science (M.S.) (p. 391)

Facilities and Special Resources

Modern laboratory, computation, and networking environments play an indispensable role in both the development and day-to-day operation of the research and education programs at the Institute for Systems Research. In all of the ISR laboratories, real-life experiments and associated research studies are enabled through the integrated design of automation and information engineering systems. Computational environments support advanced numerical simulation, sensing and control, and automated design of complex heterogeneous engineering systems. Networking environments play an indispensible role in enabling of interdisciplinary teams of faculty and students to work together. Prototype designs in both hardware and software have led to technological discoveries and patentable inventions.

ISR was established in 1985 as one of the first six National Science Foundation Engineering Research Centers (ERCs). Now a self-sustaining ERC, it is a permanent state-supported institute of the University of Maryland, within the A. James Clark School of Engineering. ISR faculty and graduate students perform basic and applied research with an emphasis on six major research directions: systems engineering methodologies and tools, global communications systems, sensor-actuated networks, next generation product-realization systems, societal infrastructure systems, and cross-disciplinary systems engineering education. ISR seeks a cohesive and balanced approach to the modeling, design, and control of large heterogeneous systems, bringing together a diversified team of outstanding engineers, scientists, and students to research, develop, and implement advances in systems engineering.

Systems Engineering, Master of Science (M.S.)

Thesis option: 30 credits
Non-thesis option (scholarly paper): 30 credits

Course	Title	Credits
Required courses:		
ENSE621	Systems Engineering Concepts and Processes: A Model-Based Approach	3
ENSE622	System Trade-off Analysis, Modeling, and Simulation	3
ENSE623	System Development, Verification, and Validation	3
ENSE624	Human Factors in Systems Engineering	3
ENSE626	System Life Cycle Analysis and Risk Management	3
Thesis or Non-Thesis Requirements		
Select one of the following options:		15
Thesis:		
Select three additional electives from one specialization area		
ENSE799	Systems Engineering Thesis	
Non-Thesis:		
Select five additional electives from no more than two specialization areas		
Complete a scholarly paper		
Specialization Options		
Select from the following specialization areas:		
Communication and Networking Systems		
Computer and Software Systems		
Control Systems		

Manufacturing Systems	
Operations Research	
Process Systems	
Robotics	
Signal Processing Systems	
Cybersecurity	
Transportation Systems	
Total Credits	**30**

General requirements for the master's thesis and non-thesis options are those of the University of Maryland Graduate School. All requirements must be completed within 5 years. The thesis option requires each student to obtain a total of 30 credit hours: 24 hours of coursework and six (6) hours for the thesis project to complete the program. The coursework includes 15 credits for the five core courses (three courses from the systems engineering core and two courses from the management core), and three (3) elective courses. The elective courses must be taken from one specialization area. The master's thesis project demonstrates the practical implications of systems engineering principles. The thesis project may be related to a practical industrial system, and must be supervised by the academic advisor.

The non-thesis option requires each student to obtain a total of 30 credit hours of coursework to complete the program (three courses from the systems engineering core, two courses from the management core, and five elective courses). The elective courses must be taken from not more than two specialization areas. In addition, students must complete a scholarly paper. Expectations of the scholarly paper: While less detailed and complex than the thesis, the scholarly paper also contributes to systems engineering research. For example, a student might chose to write a literature review, identify and propose a solution to a systems problem encountered on the job, or prepare a systems case study. The scholarly paper is prepared under the supervision of the student's academic advisor. It also must be read by at least one additional ISR faculty member, and approved by the ENSE graduate director. No specific format is required by the Graduate School.

Systems Engineering (PMSE)

Graduate Degree Program
College: Engineering

Abstract

The Professional Master of Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Systems Engineering program prepares professional engineers to coordinate the planning, development, and creation of systems in fields like aerospace, telecommunications, neuroscience, robotics, and more. Students pursuing this option may choose to use their electives to obtain a certificate in one of the many other programs offered by the Office of Advanced Engineering Education.

For domestic students the program can be completed on a part-time basis, however international students must be enrolled full time.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENSE **(**https://academiccatalog.umd.edu/graduate/courses/ense/**)**

Admissions
General Requirements

- Statement of Purpose (http://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)

For additional program-specific admission requirements, please visit: https://mage.umd.edu/systems-engineering (https://mage.umd.edu/systems-engineering/).

Applicants with an undergraduate GPA of less than 3.0 may be admitted on a provisional basis if they have demonstrated satisfactory performance in another graduate program and/or their work has been salutary.

Applicants with foreign credentials must submit academic records in the original language with literal English translations. Allow at least three months fo

GENERAL REQUIREMENTS

- Statement of Purpose (https://advancedengineering.umd.edu/application-process/)
- Transcript(s)

- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas,E,G,H,I and L visas and immigrants	March 8, 2022	September 24, 2021

RESOURCES AND LINKS:
Other Deadlines: mage.umd.edu/admissions (https://mage.umd.edu/admissions/)
Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Systems Engineering, Master of Engineering (M.Eng.) (p. 393)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Systems Engineering, Master of Engineering (M.Eng.)

Non-thesis only: 30 credits required

All Professional Master of Engineering Programs consist of 10 courses/30 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Systems Core Courses (Required)		15
ENSE621	Systems Engineering Concepts and Processes: A Model-Based Approach	
ENSE622	System Trade-off Analysis, Modeling, and Simulation	
ENSE623	System Development, Verification, and Validation	
ENSE624	Human Factors in Systems Engineering	
ENSE626	System Life Cycle Analysis and Risk Management	
Systems Pre-Approved Technical Electives (Choose five:)		15
ENPM808	Advanced Topics in Engineering (ENPM808I Logistics)	
ENPM808	Advanced Topics in Engineering (ENPM808J Design of Experiments)	
ENPM808	Advanced Topics in Engineering (ENPM808K Advanced Systems Architecting)	
ENPM808	Advanced Topics in Engineering (ENPM808M Systems Engineering Management)	
ENPM808	Advanced Topics in Engineering (ENPM808T System Acquisition Process)	
ENPM808	Advanced Topics in Engineering (ENPM808V Quality Management Systems and Lean Six Sigma)	
Total Credits		**30**

Systems Engineering (Z067)

Graduate Certificate Program
College: Engineering

Abstract

The Graduate Certificate in Engineering program is designed to assist engineers and technical professionals in the development of their careers and to provide the expertise needed in the rapidly changing business, government, and industrial environments.

Our Systems Engineering program prepares professional engineers to coordinate the planning, development, and creation of systems in fields like aerospace, telecommunications, neuroscience, robotics, and more. Students pursuing this option may choose to use their electives to obtain a certificate in one of the many other programs offered by the Office of Advanced Engineering Education.

Financial Assistance

Students in this program pay a special tuition rate, which does not differ between residents and non-residents of Maryland. This rate is not fully covered by graduate assistantships, fellowships or the tuition remission. Additional graduate student fees are charged. **Tuition and fees are subject to change.**

This program does not provide departmental assistantships or fellowships. Loans, work-study and need-based grants for citizens and permanent residents with demonstrated financial need may submit a Free Application for Federal Student Aid (FAFSA) by appropriate

FAFSA deadlines. For more information on this process, visit: https://fafsa.ed.gov/deadlines.htm.

Contact

Sam Chaplin
Coordinator for Admission and Recruitment
Maryland Applied Graduate Engineering
2105 J.M. Patterson Building
4356 Stadium Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.7200
Email: schaplin@umd.edu

Website: www.mage.umd.edu (https://mage.umd.edu/)

Courses: ENSE

Admissions

General Requirements

- Statement of Purpose (https://advancedengineering.umd.edu/apply/)
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Two (2) Letters of Recommendation are required for anyone with an undergraduate GPA below 3.0. Anyone with a GPA 3.0 or above should contact the Office of Advanced Engineering Education with a request to waive this requirement
- Graduate Record Examination (GRE) (optional)
- CV/Resume (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	December 15, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	This certificate is not currently accepting applications	This certificate is not currently accepting applications

RESOURCES AND LINKS:

Program Website: mage.umd.edu (https://mage.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) (p. 394)

Facilities and Special Resources

This program is currently offered in-person at the College Park Campus and at off-campus centers via video-teleconferencing. The Clark School of Engineering's Distance Education Technology and Services (DETS) office administers a live interactive distance education system and webcast course capture for students to take courses as they are happening or at a time convenient for their schedule. Remote sites around the State of Maryland where our courses can be taken live via DETS are at the Universities at Shady Grove in Montgomery County, and the Southern Maryland Higher Education Center in St. Mary's County. In addition to lecture dissemination, DETS provides state-of-the-art chat, bulletin board, video chat, group presentation, and discussion technologies that give our distance students the same, if not more access to faculty and their fellow students.

The Clark School's Engineering Information Technology group also provides access to needed software and computer resources through dedicated virtual computer terminals that allow distance students full access to licensed software, libraries, databases, and specialized programs.

Systems Engineering, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

All Graduate Certificate in Engineering Programs consist of 4 courses/12 credits. All students are expected to complete a preliminary course plan for their intended degree program. Degree planning worksheets can be found here: https://mage.umd.edu/degree-planning-sheets (https://mage.umd.edu/degree-planning-sheets/)

Course	Title	Credits
Systems Core Courses (Complete three):		9
ENSE621	Systems Engineering Concepts and Processes: A Model-Based Approach	
ENSE622	System Trade-off Analysis, Modeling, and Simulation	
ENSE623	System Development, Verification, and Validation	
Systems Technical Electives (Choose One):		3
ENSE624	Human Factors in Systems Engineering	
ENSE626	System Life Cycle Analysis and Risk Management	
Total Credits		**12**

Teaching English to Speakers of Other Languages (Z099)

Graduate Certificate Program
College: Education

Abstract

This certificate is only open to students enrolled at the University of Maryland, College Park. This is a cohort-based program. Please visit the department website for more information.

CONTACT

Joy Jones
Coordinator for Graduate Admissions and Student Services

Department of for Teaching and Learning, Policy, and Leadership
2311A Benjamin Building
3942 Campus Drive
College Park, MD 20742
Telephone: 301.405.3118
Fax: 301.314.9055
Email: t (tlpl-grad@umd.edu)lpl-admissions@umd.edu (tlpl-admissions@umd.edu)

Website: http://www.education.umd.edu

Courses: EDCI (https://academiccatalog.umd.edu/graduate/courses/edci/)

Admissions

Admission is not open to external candidates. This is a cohort-based program.

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume

Requirements

- Teaching English to Speakers of Other Languages, Post-Baccalaureate Certificate (P.B.C.) (p. 395)

Teaching English to Speakers of Other Languages, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

TLPL660 Second Language Acquisition

TLPL662 Second Language Acquisition

TLPL655 Student Assessment in the Second Language Classroom

TLPL665 Methods of Teaching ESOL

Teaching and Learning, Policy and Leadership (TLPL)

Graduate Degree Program
College: Education

Abstract

The TLPL **Ph.D.** program gives students a choice of six related specializations:

1. Education Policy and Leadership,
2. Language, Literacy and Social Inquiry,
3. Mathematics and Science Education,
4. Minority and Urban Education,
5. Teacher Education and Professional Development, and
6. Technology, Learning and Leadership.

These specializations prepare doctoral students to assume a variety of roles, including scholars, researchers, policy analysts, teacher educators, instructional specialists, curriculum developers, teachers, education leaders and advocates. They also provide students with new opportunities for interdisciplinary study that emphasize scholarship in critical areas of education research, including teacher preparation, STEM fields of education, literacy and language acquisition, education policy and leadership. For more details please visit http://www.education.umd.edu/TLPL/academics/programs.html.

This section includes information about the Ph.D. program sponsored by the Department of Teaching and Learning, Policy and Leadership (TLPL). For information about our master's programs please see Teaching and Learning, Policy and Leadership (EDTL), and also Education: Curriculum and Instruction (EDCI).

Financial Assistance

The Department offers graduate assistantships to all newly admitted, full-time Ph.D. students. In addition, TLPL is able to award a limited number of Graduate School fellowships each year. These fellowships are awarded only to full-time graduate students. All Ph.D. applicants seeking to become full-time suddens will be considered for a fellowship—no additional application is needed.

Contact

Kay Moon
Coordinator for Graduate Admissions and Student Services
Department of Teaching and Learning, Policy, and Leadership
2311A Benjamin Building
3942 Campus Drive
College Park, MD 20742
Telephone: 301.405.3118
Fax: 301.314.9055
Email: (https://academiccatalog.umd.edu/graduate/programs/teaching-learning-policy-leadership-tlpl/tlpl-admissions@umd.edu)t (tlpl-grad@umd.edu)lpl-admissions@umd.edu (tlpl-admissions@umd.edu)

Website: http://www.education.umd.edu/TLPL

Courses: TLPL (https://academiccatalog.umd.edu/graduate/courses/tlpl/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample

Applications for the Ph.D. program are accepted for the Fall only.

To be recommended for full admission to the TLPL Ph.D. program, a minimum undergraduate grade point average of 3.0 is required. A minimum graduate grade point average of 3.5 is required for applicants who have completed a graduate program. Students who do not meet one of these requirements, but show other evidence of outstanding potential, will be considered for provisional admission. Admission offers are limited to match available financial and faculty resources. Note that the GRE is not required. See the description of the TLPL programs and admissions overview on the TLPL website for more detailed information: http://www.education.umd.edu/TLPL/.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants	
F (student) or J (exchange visitor) visas A,E,G,H,I and L visas and immigrants	December 1, 2021

RESOURCES AND LINKS:
Program Website: https://education.umd.edu/academics/departments/tlpl (https://education.umd.edu/academics/departments/tlpl/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Teaching and Learning, Policy and Leadership, Doctor of Philosophy (Ph.D.) (p. 396)

Facilities and Special Resources

Faculty and students in the department work closely with area schools, colleges, universities, associations and other education-related organizations. Extensive resources in the Washington, D.C., area, including embassies and other international organizations, provide exceptional opportunities for internships and field experiences, research, and materials to enhance formal course experiences. Facilities that support graduate study include the Center for Mathematics Education, the Center for Science and Technology in Education, the Multilingual Research Center, and the Maryland Equity Project. Additional facilities in the College of Education include the Educational Technology Services Center.

Teaching and Learning, Policy and Leadership, Doctor of Philosophy (Ph.D.)

The Ph.D. degree requires a planned sequence of 60 credits beyond a master's degree OR 90 credits beyond a bachelor's degree. In addition to major and elective courses, this includes 6 credits of integrative departmental core, a minimum of 12 credits in intermediate and advanced research methods, 30 credits within the student's specialization and 12 credits of dissertation research. After students have completed most of their course work, the equivalent of 12 hours of comprehensive examination is required prior to advancing to candidacy and approval of the doctoral dissertation committee. The comprehensive exam may take a variety of forms, such as take-home conceptual essays, literature reviews, or research papers. The Doctoral program integrates theory, research, and practice, and students are expected to demonstrate high standards of scholarship and the ability to engage in independent research. Your faculty advisor will help you develop a program of study that will help you fulfill your degree requirements, both coursework and examinations, that is consistent with Departmental and University guidelines. An oral examination in defense of the dissertation is required. It is strongly recommended that prospective doctoral applicants speak with program coordinators and faculty, and visit the Department and classes, to help determine if the Department's programs are appropriate to their academic interests and professional goals.

Students must complete a minimum of 60 credits beyond the master's degree. Coursework is outlined as follows:

Course	Title	Credits
Core Requirements		
TLPL794	Foundations of Educational Research I	3
TLPL795	Foundations of Educational Research II	3
Complete 12 credits in Intermediate & Advanced Methods [1]		12
Specialization Requirements		
Complete coursework in one of the following specializations:		30
Education Policy & Leadership		
Language, Literacy & Social Inquiry		
Mathematics & Science Education		
Urban Education		
Teacher Education & Professional Development		
Technology, Learning & Leadership		
Dissertation Research Requirements		
TLPL899	Doctoral Dissertation Research	12
Total Credits		**60**

[1] Must include one qualitative methods course and one quantitative methods course

Technology Entrepreneurship (MPTE)

Graduate Degree Program
College: A. James Clark School of Engineering

Abstract

The Master of Professional Studies in Technology Entrepreneurship unites academic insights with startup incubator skills and resources to empower students to launch and grow technology ventures. Developed by the A. James Clark School of Engineering's Maryland Technology Enterprise Institute (Mtech), University of Maryland, the MPS in Technology Entrepreneurship is a fully online program designed to equip students with a conceptual understanding of the principles and action steps of effective new venture creation and launch.

The MPS in Technology Entrepreneurship prepares students to apply newly gained insights and acquired competencies to real-world innovation management challenges across five major stages of the innovation value chain from strategy development and idea generation to commercial concept and product development and successful market establishment, as well as sustainable growth in various contexts.

The MPS in Technology Entrepreneurship is committed to teaching the disciplines of entrepreneurial thinking that produce not just entrepreneurial inspirations but an entrepreneurial frame of mind. Courses are offered during 12-week terms. The 30-credit, 9-course graduate program may be completed in as little as 15 months by enrolling in two 3-credit courses in the first four 12-week terms and a 6 credit capstone course in the final term.

Offered through the convenience and flexibility of the online learning environment, the program enables student to:

- Think beyond current paradigms in order to discover innovation needs and to envision impact through strategic idea and concept development .
- Leverage ideas to create sustainable business models aligned with customer needs and wants in competitive marketplaces.
- Manage commercialization challenges and market launch efficiently and effectively.
- Navigate the legal aspects of product development and company launch and build sound financial and accounting strategies and practices.
- Know how to accelerate growth and create sustainable value through appropriate business development, risk management, financing, and value extraction strategies.

Contact

Maryland Technology Enterprise Institute
4467 Technology Dr.
University of Maryland
College Park, MD 20742
Telephone: 301-314-9223
Email: mpte@umd.edu
Program Website: mte.umd.edu (https://mte.umd.edu/)

Admissions

General Requirements

- Statement of Purpose
- TOEFL/IELTS/PTE (Select International Graduate Students (https://gradschool.umd.edu/education/z069/))
- There are no requirements for the GMAT, GRE, or recommendations.

Program-Specific Requirements

- CV/Resume

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Admitted students participate 100% as online students. **Immigration documents (F1 or J1 student visas or an I-20) are not required or issued for this fully online program.** In addition to the above minimum qualifications, international students and applicants with foreign credentials have additional requirements per the Office of International Student & Scholar Services (ISSS).

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	July 29, 2022	January 31, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	July 29, 2022	January 31, 2022

RESOURCES AND LINKS:
Program Website: http://ter.ps/mpte (http://ter.ps/mpte/)
Application Process: www.gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Requirements

- Technology Entrepreneurship, Master of Professional Studies (M.P.S.) (p. 397)

Technology Entrepreneurship, Master of Professional Studies (M.P.S.)

Non-thesis only: 30 credits required

Course	Title	Credits
Required courses:		
ENES662	Innovative Ideas and Concept Development	3
ENES663	Strategies for Managing Innovation	3
ENES664	Business Modeling and Customer Validation	3
ENES665	Innovative Thinking	3
ENES666	Creative Design, Prototyping, and Testing	3
ENES667	Market Development and Commercialization	3
ENES670	Financial Management and New Venture Financing	3
ENES671	Legal Aspects of Entrepreneurship	3
ENES672	Launching Technology Startup Ventures	6
Total Credits		**30**

Technology Ventures and Innovation (Z068)

Graduate Certificate Program
College: Engineering

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.mtechventures.umd.edu

Admissions

This certificate is not currently accepting applications.

Requirements

- Technology Ventures and Innovation, Post-Baccalaureate Certificate (P.B.C.) (p. 398)

Technology Ventures and Innovation, Post-Baccalaureate Certificate (P.B.C.)

This program is not currently accepting applications.

Telecommunications (ENTS)

Graduate Degree Program
College: Engineering

Abstract

The Master's in Telecommunications Program offers students a unique opportunity to engage in cross-disciplinary coursework from both the Electrical and Computer Engineering Department of the A. James Clark School of Engineering and the Robert H. Smith School of Business at the University of Maryland. This extraordinary combination culminates in a degree that prepares students for the broad range of rigors and issues that encompass the dynamic telecommunications industry.

The program covers several different areas including Information System Security, Wireless Communications, Networking, and Business and Management for the telecommunications industry. The program may be pursued either full-time or part-time. All courses are scheduled in the evening to suit working professionals, while some courses additionally offer daytime sections.

The program is designed around a core curriculum that provides a solid technical foundation and management background. The Master's in Telecommunications degree requires successful completion of 30 credits and a scholarly paper. Please visit our Degree Requirements (http://www.telecom.umd.edu/degree-requirements/) page for detailed information.

Students may choose from a wide range of electives to develop their interests and complement their career goals. Please visit our Course Descriptions (http://telecom.umd.edu/courses/) page for a detailed listing of our courses. In addition to the courses listed there, special topics electives are regularly offered. As our program keeps up with industrial trends, these courses focus on emerging, cutting-edge topics.

Please see our website, www.telecom.umd.edu (http://www.telecom.umd.edu), for the most current information.

Financial Assistance

Since the Master's in Telecommunications Program does not normally offer financial support in the form of graduate assistantships, many of our students find assistantships in other units, especially non-academic units, which do not have graduate students.

Contact

Master's in Telecommunications Program Office
2433 A.V. Williams Building
8223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3682
Fax: 301.314.9324
Email: telecomprogram@umd.edu

Website: http://www.telecom.umd.edu

Courses: ENTS (https://academiccatalog.umd.edu/graduate/courses/ents/)

Relationships: Electrical and Computer Engineering (ENEE) (p. 168)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume

The program is open to applicants holding a regionally accredited baccalaureate degree in engineering, computer science, math, physics or related technical fields with a minimum GPA of 3.0. Applicants with an undergraduate GPA of slightly less than 3.0 may be considered if they have demonstrated strong performance in prior graduate study and/or professional experience.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	May 3, 2022	September 30, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	March 15, 2022	September 30, 2021

RESOURCES AND LINKS:
Program Website: http://www.telecom.umd.edu
Application Process: gradschool.umd.edu/admissions (http://www.gradschool.umd.edu/admissions/)

Requirements

- Telecommunications, Master of Science (M.S.) (p. 398)

Facilities and Special Resources

The ENTS program has a number of state-of-the art laboratory facilities where students enhance their hands-on skills and gain practical experience using, configuring and operating telecom lab equipment. (link: https://telecom.umd.edu/lab-facilities (https://telecom.umd.edu/lab-facilities/)). These labs include the Communications Laboratory, the Networking Laboratory, and the Telecommunications PC Lab,

Telecommunications, Master of Science (M.S.)

Non-thesis only (scholarly paper required): 30 credits

Requirements to earn the Master's in Telecommunications degree include completing 30 credit hours of course work, achieving a cumulative grade point average (GPA) of at least 3.0, and submitting a satisfactory scholarly paper. The 30 credits include eight required courses and two elective courses. All graduate students at the University of Maryland are required to maintain a 3.0 GPA each semester to remain in good standing.

Additional courses beyond the required courses must be approved by the Program Office and should not impede the student's progress towards degree completion. ALL courses taken at the University of Maryland count towards the student's cumulative GPA.

Course	Title	Credits
Required courses:		
ENTS622	Introduction to Digital Communication Systems	3
ENTS640	Networks and Protocols I	3
ENTS641	Networks and Protocols II	3
ENTS625	Management and Organizational Behavior in the Telecommunications Industry	3
ENTS630	The Economics of International Telecommunications	3
ENTS632	Telecommunications Marketing Management	3
ENTS635	Decision Support Methods for Telecommunication Managers	3
Select one additional approved core course		3
Electives		6
Students must also complete a scholarly paper by the time of graduation		
Total Credits		**30**

Terrorism Analysis (Z039)

Graduate Degree Program
College: Behavioral and Social Sciences

Abstract

The National Consortium for the Study of Terrorism and Responses to Terrorism (START) is dedicated to training and mentoring a new generation of scholars and analysts capable of examining questions related to the behavior of terrorists and terrorist groups and to the issue of how societies can best prepare for dealing with a terrorist threat or responding to a terrorist attack. START's Graduate Certificate in Terrorism Analysis provides participants with advanced education on the causes, dynamics and impacts of international and domestic terrorism. Participants also develop the methodological skills necessary to pursue advanced research on and analysis of terrorism. The program consists of four required courses. Each course is offered once per calendar year, in an online, synchronous learning environment. The program can be completed in as little as 12 months to 24 months.

The program is appropriate for individuals interested in (and/or currently) working in fields related to intelligence analysis, homeland security analysis, or analysis of other relevant topic areas; and individuals interested in (and/or currently) conducting scholarly research on terrorism and responses to terrorism. To request a virtual information packet, set up a virtual information appointment, or receive information about an upcoming information session: please contact the Education team at education-start@umd.edu.

Financial Assistance

START does not currently provide financial assistance to Graduate Certificate students.

Contact

Marcus Boyd
Graduate Director
National Consortium for the Study of Terrorism and Responses to Terrorism
P.O. Box 266, 5245 Greenbelt Rd.
College Park, MD 20740
Telephone: 301.405.7184
Email: boydma@umd.edu (education@start.umd.edu)

Website: http://www.start.umd.edu

Courses: BSST

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

Program-Specific Requirements

- Letters of Recommendation (optional)
- CV/Resume
- Writing Sample (optional)
- Description of Research/Work Experience (optional)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Eligible applicants must have earned a 4-year baccalaureate degree from a regionally-accredited U.S. institution, or an equivalent degree at a foreign university. A 3.0 GPA is preferred, but experience may substitute. GRE scores are not required. All applications must be submitted via the online application available at: www.gradschool.umd.edu/gss/admission.html (http://www.gradschool.umd.edu/gss/admission.html). All application materials must be received by the deadlines as described below.

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Fall 2021: August 3, 2021	January 7, 2022
	Fall 2022: August 5, 2022	
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Fall 2021: August 3, 2021	N/A

RESOURCES AND LINKS:
Program Website: http://www.start.umd.edu

Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Terrorism Analysis, Post-Baccalaureate Certificate (P.B.C.) (p. 400)

Facilities and Special Resources

The START Consortium at the University of Maryland has pulled from its extensive experience in the field of terrorism research and analysis in order to formulate the Graduate Certificate curriculum. Students are drawn from the academic and professional worlds, which brings a range of perspectives to the virtual classroom. Its goal is to provide a well rounded and sophisticated approach to the subject matter and to cultivate a stimulating learning environment.

Terrorism Analysis, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Required courses:		
BSST630	Motivations and Intents of Terrorists and Terrorist Groups	3
BSST631	Societal Impacts of and Responses to Terrorism	3
BSST636	Quantitative Research Methods in Terrorism Studies	3
or BSST637	Qualitative Research Methods in Terrorism Studies	
Choose one of the following electives:		3
BSST634	Legal and Criminal Approaches to Counterterrorism	
BSST635	Countering Violent Extremism: Policy and Practice	
BSST638	Special Topics in Terrorism Studies (BSST638J - Disaster Recovery in Japan)	
BSST638	Special Topics in Terrorism Studies (BSST638S - Countering Violent Extremism and Deradicalization in International Contexts)	
BSST670	Course BSST670 Not Found	
BSST671	Course BSST671 Not Found	
BSST672	Course BSST672 Not Found	
BSST699	Independent Study in Terrorism Studies (BSST699G - Geospatial Analysis of Terrorism)	
BSST699	Independent Study in Terrorism Studies (BSST699N - Social Network Analysis of Terrorism)	
BSST699	Independent Study in Terrorism Studies (BSST699W - Introduction to Wargaming)	
Total Credits		**12**

Theatre Design (MFAT)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Theatre, Dance, and Performance Studies offers a three-year Master of Fine Arts degree in Theatre Design, with concentrations in costume, scenic, lighting and multimedia. The degree offers superior students advanced training in design with on-campus and off-campus opportunities for creative activity. The program prepares the student to enter the professional theatre or to teach in the creative areas at colleges or universities. The School also offers MA and PhD degrees in theatre history and performance studies, and MFA degree in Dance, For more information visit the School website at http://tdps.umd.edu.

Financial Assistance

The School nominates outstanding applicants for competitive University fellowships. Teaching assistantships are available to a limited number of students. The Graduate program head will discuss these with accepted students at the time of acceptance.

Contact

Crystal Gaston
Coordinator of Graduate Services
Theatre, Dance, and Performance Studies
2808 Clarice Smith Performing Arts Center
8115 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6675
Email: cgaston@umd.edu

Misha Kachman
Associate Professor
Theatre, Dance, and Performance Studies
2739 Clarice Smith Performing Arts Center
8115 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6639
Email: mkachman@umd.edu

Website: http://tdps.umd.edu/programs/mfa-design (http://tdps.umd.edu/programs/mfa-design/)

Courses: THET (https://academiccatalog.umd.edu/graduate/courses/thet/)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Portfolio PDF Upload: A sample of work submitted through a professional website, or via a file uploaded.
- Applicants interested in multimedia design: Should select lighting design as their area of interest on the online application.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	May 13, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	February 15, 2022

RESOURCES AND LINKS:
Program Website: http://tdps.umd.edu/programs/mfa-design (http://tdps.umd.edu/programs/mfa-design/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Theatre Design, Master of Fine Arts (M.F.A.) (p. 401)

Facilities and Special Resources

The School of Theatre, Dance, and Performance Studies is housed in the Clarice Smith Performing Arts Center at Maryland. This state-of-the-art facility includes the 650-seat Ina and Jack Kay Theatre, the 200-seat Robert and Arlene Kogod Theatre and the 100-seat Cafritz Theatre.

The campus is within a few miles of the John F. Kennedy Center for the Performing Arts, Arena Stage, the National Theatre, Ford's Theatre, The Shakespeare Theatre at the Lansburgh, and the Olney Theatre Center, which are among more than 80 professional area theatres. Two of the greatest libraries in the world, the Library of Congress and the Folger Shakespeare Library, are in close proximity to campus. Students also make regular use of the Smithsonian Institution, the Federal Theatre Project Archives, the National Archives, and more than 50 specialized libraries and institutions in the Washington metropolitan area.

Theatre Design, Master of Fine Arts (M.F.A.)

Total Credits: Minimum of 60 credits required

Student designers must present and pass three formal design portfolio reviews, at the conclusion of their second, fourth, and sixth semesters in the program. In addition, portfolio interviews take place at the end of the first, third, and fifth semesters. Design portfolios include studio projects as well as fully realized academic and professional scenic, costume, or lighting designs. The fourth semester portfolio review will include an evaluation of a pre-thesis design project (usually a fully realized design, but may include independent study design projects). The pre-thesis design project, in preparation for the thesis, will include a written component. Successful completion of the portfolio reviews will result in the assignment of the thesis project.

Portfolio requirements

Successful completion of the portfolio review will result in the assignment of pre-thesis (after the first year) and thesis (after the second year) projects. Upon completion of each portfolio review, the candidate will receive a formal letter indicating a grade of pass, conditional pass, or fail. In the event of a conditional pass or fail, the faculty may require the candidate to complete additional projects or coursework.

First year portfolio should include:

- A current resume
- Projects from primary and secondary design emphasis courses
- Craft projects from foundation component courses
- Production photographs illustrating realized craft or design work for projects produced by the School or by professional theatres
- Supporting materials, drawings, and photographs that demonstrate effective and productive work as a design assistant (academic or professional projects)

Second year portfolio should include:

- A current resume
- Projects from primary and secondary design emphasis courses
- Production photographs illustrating realized craft or design work for projects produced by the School or professional theaters
- Supporting materials, drawings, and photographs that demonstrate effective and productive work as a design assistant (academic or professional projects)
- A written design analysis and supporting research material for the pre-thesis project that should follow the form of the first chapter of the written component of the thesis project

For their thesis, M.F.A. design students create and realize a scenery, costume, or lighting design for a major production. Each student must meet all deadlines for that production and the design and execution must be acceptable to all members of her/his thesis committee. The written component of the thesis includes all relevant visual material, including research images, drawings, renderings, and production photographs.

M.F.A students typically design three or four productions in our main season during their three years in residence. The first year of study includes several assistant design assignments. We plan our productions at least one semester in advance; therefore, there is a good possibility that students will be designing their first main season production in the spring semester of the first year. We produce five main season shows and approximately five student produced productions per academic year. M.F.A. students also have the opportunity to work with our award-winning faculty on professional projects within the Washington metropolitan theatre community, as well as work in regional theatres, off-Broadway and Broadway.

An exciting feature of the MFA in Design program in the School of Theatre, Dance, and Performance Studies is the annual public portfolio exhibit and review. Each year the Cafritz Theatre is transformed into a gallery where all MFA Design students display their set, costume, and lighting designs.

A multi-day affair, the first day is open to the general public when professional designers and directors from the Washington, DC theatre community have an opportunity to respond to student work and where students often make important professional contacts. The second day involves longer one-on-one critique sessions with the nation's leading designers and directors.

In the past few years our respondents have included designers and directors such as **Paloma Young, Donyale Werle, Jeff Croiter, Ming Cho Lee, John Lee Beatty, David Korins, Ken Posner, Linda Roethke, Serge**

Seiden, Joy Zinnoman, John Iacovelli, Aaron Posner, James Kronzer, Mary Zimmerman, Jim Ingalls, and Anna Kuzmanic.

Curriculum Requirements

Students choose from one of the following specializations: Costume Design, Scene Design, Lighting Design, or Projected Design. Teaching Assistants should complete one credit of THET606. Course requirements are as follows:

Course	Title	Credits
Core Requirements		**30-36**
THET465	History of Fashion for the Theatre	
THET6xx	Introduction to Theatre Design	
THET670	Period Style for the Theatre: Fashion and Decor	
THET788	Master's Tutorial	
THET789	Master's Practicum	
THET799	Master's Thesis Research	
Studio:		**15-18**
THET649	Advanced Design Studio in Costume	
THET639	Advanced Design Studio in Scenery	
THET659	Advanced Design Studio in Lighting	
THET678	Theory of Visual Design For the Performing Arts	
Electives		**6-15**
Select additional electives chosen with your advisor		
Specialization Options:		
Costime Design		
Scene Design		
Lighting Design		
Projected Design		

Theatre and Performance Studies (THPF)

Graduate Degree Program
College: Arts and Humanities

Abstract

The School of Theatre, Dance, and Performance Studies offers a Master of Arts in Theatre and Performance Studies and Doctor of Philosophy in Theatre and Performance Studies (THPF). For more information visit the School website at http://tdps.umd.edu/programs/phd-theatre-and-performance-studies (http://tdps.umd.edu/programs/phd-theatre-and-performance-studies/). The School also offers graduate degrees in MFA in Theatre Design and MFA in Dance.

The M.A. program is designed to enhance and develop students' practical, historical, and critical knowledge of theatre so that they may go on to graduate work in Ph.D. or M.F.A programs, or upgrade their skills for high-school teaching. The School's application deadline for best consideration for the MA program and the PhD program is January 15. Applications fully submitted by February 1 may also receive consideration on a space available basis.

The doctoral program in Theatre and Performance Studies is an interdisciplinary course of study that prepares students for careers as educators, professors in higher education, publishing scholars, and cultural critics. The program offers a rigorous exploration of both Theatre History and Performance Studies through the critical and theoretical analyses of historical archives, dramatic and performance texts, and cultural behavior as performance. Applicants who do not hold an undergraduate or graduate degree in theatre (or an equivalent field), may be required to take preparatory coursework prior to admission into the Ph.D. program.

Financial Assistance

The School nominates outstanding applicants for competitive University fellowships. Teaching assistantships are available to a limited number of students. The Graduate program head will discuss these with accepted students at the time of acceptance.

Website: http://tdps.umd.edu

Contact

James Harding
Professor and Director of Graduate Studies
Theatre, Dance, and Performance Studies
2822 Clarice Smith Performing Arts Center
8115 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6695
Email: jharding@umd.edu

Crystal Gaston
Coordinator of Graduate Studies
Theatre, Dance, and Performance Studies
2809 Clarice Smith Performing Arts Center
8115 Alumni Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.6675
Email: cgaston@umd.edu

Courses: THET (https://academiccatalog.umd.edu/graduate/courses/thet/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample: A 10 – 15 page paper demonstrating ability to do university level research – uploaded to the Uploads Requirement section of the application.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	February 9, 2022

International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	February 9, 2022

RESOURCES AND LINKS:
Program Website: http://www.tdps.umd.edu
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Theatre and Performance Studies, Doctor of Philosophy (Ph.D.) (p. 403)
- Theatre and Performance Studies, Master of Arts (M.A.) (p. 403)

Facilities and Special Resources

The School of Theatre, Dance, and Performance Studies is housed in the Clarice Smith Performing Arts Center at Maryland. This state-of-the-art facility includes the 650-seat Ina and Jack Kay Theatre, the 200-seat Robert and Arlene Kogod Theatre and the 100-seat Cafritz Theatre.

The campus is within a few miles of the John F. Kennedy Center for the Performing Arts, Arena Stage, the National Theatre, Ford's Theatre, The Shakespeare Theatre at the Lansburgh, and the Olney Theatre Center, which are among more than 80 professional area theatres. Two of the greatest libraries in the world, the Library of Congress and the Folger Shakespeare Library, are in close proximity to campus. Students also make regular use of the Smithsonian Institution, the Federal Theatre Project Archives, the National Archives, and more than 50 specialized libraries and institutions in the Washington metropolitan area.

Theatre and Performance Studies, Master of Arts (M.A.)

Thesis option: minimum of 36 credits
Non-thesis option: minimum of 36 credits

The Department offers both the thesis and non- thesis options. All students undertaking the M.A. degree must pass a six-hour comprehensive examination on theatre history and criticism, performance and directing, and design and technical theatre. Please contact the Head of History/Theory to get more details.

Course	Title	Credits
Required courses:		
THET600	Introduction to Graduate Research Methods	3
THET606	Teaching Theatre [1]	1
Thesis or Non-Thesis Requirements		
Select one of the following options:		32
Thesis:		
THET799	Master's Thesis Research	
Non-Thesis:		
Students are required to submit two article-length essays to the Non-thesis Examining Committee		
Total Credits		**36**

[1] All Teaching Assistants must take THET606.

Students should consult with their advisor to determine the remainder of their coursework.

Theatre and Performance Studies, Doctor of Philosophy (Ph.D.)

Students are required to complete a set of core courses, electives, and dissertation research. In addition, students must fulfill the production/performance requirement.

Members of the student's comprehensive examination committee write the questions. Area questions are designed to interrogate both literary and performance issues. Selected by the student and her/his advisor, the examination committee consists of the advisor and at least two members of the core and/or affiliate faculty. Exams may be taken one of two ways: in-house or take home with an oral defense. The examinations are based on course work and reading lists. All students are responsible for a core reading list of approximately 15-20 books and articles. In addition to the core reading lists, each student will be responsible for developing a reading list of no less than 50 books and articles reflective of the student's dissertation topic and tailored to his/her interests as they relate to the examination areas. Students devise these lists in consultation with the members of her/his committee. Students have two opportunities to pass the comprehensive examinations. Please note that the examinations are only offered at specific times each semester and that students must plan to take the comprehensive exams during these times.

All doctoral students will engage in original research (in some cases, complemented by appropriate non-print documentation), the result of which is a book-length manuscript. In consultation with her/his advisor, the student selects a five-member dissertation committee. At least three committee members must be permanent members of the University of Maryland Graduate Faculty and each committee must have a chairperson who is a permanent member of the graduate faculty. Please note that the Dean's Representative on the committee may not be a member of the History/Theory Area, but must be from another department at the University of Maryland. In rare cases, students will need an expert in an area not represented by the History/Theory Faculty. Students are reminded that these members must be present at the defense and that the Department cannot guarantee to fund the travel of committee members from other universities.

Each doctoral student must defend her/his dissertation orally as a requirement in partial fulfillment of the doctoral degree. Dissertations must follow the guidelines established by the University. Please see the Graduate Student Handbook (available online through the Graduate School) for guidelines on committee selection and defense procedures.

Course	Title	Credits
Required courses:		
THET606	Teaching Theatre [1]	1
THET700	Introduction to Graduate Research Methods	3
THET711	Critical Theory	3
THET712	Historical Research Methods and Historiography in Theatre	3
THET713	Performance Studies	3
Select electives within the School of Theatre Dance and Performance Studies		12

Select electives outside of the School of Theatre Dance and Performance Studies		6
Comprehensive Exams:		
History of Drama and Performance		
Theory of Drama and Performance		
Dissertation Prospectus		
Dissertation Research Requirements		
THET899	Doctoral Dissertation Research	12
Total Credits		**43**

[1] All teaching assistants should complete one credit of THET606.

Toxicology, Doctor of Philosophy (Ph.D.)

The PhD in Toxicology requires a minimum of 46 credits, in addition to 12 credits of TOXI899. Students are also required to complete a minimum of 12 credits in two areas of specialization (six credits in each), included in the 46 credit total.

The PhD program consists of a minimum of 46 credit hours of graduate courses, in addition to 12 credits of Doctoral Dissertation Research. The two areas of specialized focus could be in areas like Advanced Epidemiology/Biostatistics, Analytical Chemistry, Pharmacology, Pathology/Immunology/Microbiology, or Environmental Science/Ecology/Climate. Program requirements for a PhD degree in toxicology also include successful completion of a written and oral comprehensive exam in the format of an NIH research proposal, oral defense of a written dissertation research proposal, and a minimum of 12 credits of PhD dissertation research, written dissertation, and a final dissertation defense. The program can be completed on either a full- or part time basis. It is anticipated that students will complete more than the minimum number of credits.

Course	Title	Credits
Required courses:		
MIEH720	Principles of Toxicology	3
MIEH740	Environmental Health Risk Assessment	3
MIEH770	Law and Policy in Environmental Health	3
MIEH771	Exposure Assessment of Environmental Hazards	3
EPIB610	Foundations of Epidemiology	3
EPIB611	Intermediate Epidemiology	3
EPIB650	Biostatistics I	3
EPIB651	Applied Regression Analysis	3
EPIB641	Public Health and Research Ethics	1
TOXI609	Methods in Toxicology	6
MIEH688	Seminar in the Maryland Institute for Applied Environmental Health: Current Topics in Environmental Health	3
HLTH665	Health Behavior I	3
HLSA601	Introduction to Health Systems	3
Specialization one courses		6
Specialization two courses		6
Dissertation Research Requirements		
TOXI899	Doctoral Dissertation Research	12
Total Credits		**64**

Toxicology, Master of Science (M.S.)

The M.S. program in Toxicology does not directly admit students.

Translation (MPTR)

Graduate Degree Program
College: Arts and Humanities

Abstract

The Master of Professional Studies in Translation (MPS in Translation) is designed to equip students with the required competencies to compete successfully for work as specialized translators, project managers, or administrators of language services.Example skills include the translation of specialized texts in health, legal and political settings, including the translation of documents and websites for major corporations, international organizations, and government ministries.

The MPS in Translation is a two-year, 41 credit program. In the first year, you begin to develop high-level skills in translation in specific domains (specialized written texts). In the program's second year, you build on these fundamental skills, specializing in written communication for governmental and international organizations.

Contact

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Website: http://www.gsit.umd.edu

Relationships: Consecutive Interpreting (Z080) (p. 139) Interpreting (MPIN) (p. 258) Translation (Z079) (p. 405)

Courses: COMM (https://academiccatalog.umd.edu/graduate/courses/comm/)

Admissions

This program is not currently accepting applications

Requirements

- Translation, Master of Professional Studies (M.P.S.) (p. 405)

Translation, Master of Professional Studies (M.P.S.)

41 credits required

Students select either the Translation track or the Translation and Localization Project Management track. In either track, students can focus on two languages or three.

Regardless of track or number of languages, all MPTR students must complete the following courses:

Course	Title	Credits
Core Requirements		
COMM610	Introduction to Translation and Interpreting Studies	3
COMM683	Intercultural Communication Theory	3
COMM789	Seminar: Special Topics in Intercultural Communication	3
COMM669	Professional Practice Forum in Translation: Practicum	1
COMM730	Seminar in Health Communication	3
or COMM762	The Rhetoric of Political Institutions	
Additional course requirements [1]		28
Total Credits		**41**

[1] Students should check the department website for the remainder of their course requirements. The remainder of the course requirements vary based on the student's track and number of languages.

Translation (Z079)

Graduate Certificate Program
College: Arts and Humanities

abstract

The Graduate Certificate in Translation provides one-year, 21-credit of full-time core training in the fundamental skills of translation, translation for specific domains, translation studies, the translation profession, intercultural communication, and background knowledge in at least one of the following communication contexts: political communication, legal communication, health communication, or specific domains that correspond to demands of specific language markets. Students enroll in 10 to 11-credits in the fall semester; 10 to 11-credits in the spring semester as detailed in the GC-Translation Plan of Study (https://oes.umd.edu/sites/oes.umd.edu/files/OES/PGP/GSIT/gsit_plan_gc_translation.pdf).

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Website: http://www.gsit.umd.edu

Relationships: Consecutive Interpreting (Z080) (p. 139) Interpreting (MPIN) (p. 258) Translation (MPTR) (p. 404)

Courses: COMM (https://academiccatalog.umd.edu/graduate/courses/comm/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/)): A minimum of 6 months proof of residency in a country where your primary acquired language is spoken.

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Supplementary Application (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/admissionsforms/umdsupplementaryapplicationmptrmpinz079z080z105z1062021.pdf)
- Supplementary Application 2
- Proof of residency: A minimum of 6 months proof of residency in a country where your primary acquired language is spoken.
- Admissions tests (contact oes@umd.edu)

APPLICATION DEADLINES

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	April 1, 2022	November 17, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	February 16, 2022	August 18, 2021

RESOURCES AND LINKS:

Program Website: http://www.gsit.umd.edu

Application Process: https://gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Translation, Post-Baccalaureate Certificate (P.B.C.) (p. 406)

Translation, Post-Baccalaureate Certificate (P.B.C.)

The Graduate Certificate of Professional Studies in Translation (GCPS in Translation) is designed to equip you with the knowledge and skills required for entry-level work in the translation profession. Examples include serving as translators of general texts for information purposes and specialized texts in subject areas wherein you hold advanced qualifications (e.g., Master of Arts degree, and/or significant professional expertise). You will be grounded in the tenets of the profession, including professional conduct and ethics and guided through the steps needed to advance your professional skill set.

The GCPS in Translation is a 21-credit one year program, offering instruction in the fundamental skills of translation and includes the theoretical fields of translation studies, the translation professions, intercultural communication, and background knowledge in at least one of the following communication contexts: political communication, legal communication, or health communication.

two languages track

Course	Title	Credits
COMM610	Introduction to Translation and Interpreting Studies	3
COMM639	Fundamentals of Translation	4
COMM683	Intercultural Communication Theory	3
COMM649	Translation for Specific Domains	4
Select four credits of the following courses:		4
COMM609	Fundamentals of Interpreting	
COMM641	Introduction to Computer-Assisted Translation	
COMM798	Independent Study (COMM798F - English Fluency Enhancement)	
COMM798	Independent Study (COMM798G - Editing in English Writing)	
COMM798	Independent Study (Intensive Writing)	
COMM798	Independent Study (Public Speaking)	
Select four credits of the following courses:		4
COMM629	Introduction to Simultaneous Interpretation	
COMM730	Seminar in Health Communication	
COMM762	The Rhetoric of Political Institutions	
COMM619	Consecutive Interpretation	
COMM798	Independent Study (COMM798F - English Fluency Enhancement)	
COMM798	Independent Study (COMM798G - Editing in English Writing)	
COMM798	Independent Study (Intensive Writing)	
COMM798	Independent Study (Public Speaking)	
Select one of the following courses:		3
COMM730	Seminar in Health Communication	
COMM762	The Rhetoric of Political Institutions	
Total Credits		**25**

THREE LANGUAGES TRACK

Course	Title	Credits
COMM610	Introduction to Translation and Interpreting Studies	3
COMM639	Fundamentals of Translation	6
COMM683	Intercultural Communication Theory	3
COMM649	Translation for Specific Domains	6
Course selection depends on language combination:		3 credits minimum
COMM609	Fundamentals of Interpreting	
COMM641	Introduction to Computer-Assisted Translation	
COMM798	Independent Study (COMM798F - English Fluency Enhancement)	
COMM798	Independent Study (COMM798G - Editing in English Writing)	
COMM798	Independent Study (Intensive Writing)	
COMM798	Independent Study (Public Speaking)	
COMM629	Introduction to Simultaneous Interpretation	
COMM730	Seminar in Health Communication	
COMM762	The Rhetoric of Political Institutions	
COMM619	Consecutive Interpretation	
COMM798	Independent Study (COMM798F - English Fluency Enhancement)	
COMM798	Independent Study (COMM798G - Editing in English Writing)	
COMM798	Independent Study (Intensive Writing)	
COMM798	Independent Study (Public Speaking)	
COMM730	Seminar in Health Communication	
COMM762	The Rhetoric of Political Institutions	
Total Credits		**18-21**

Transportation Policy and Planning (Z030)

Graduate Certificate Program
College: Architecture

This certificate is not currently accepting applications. Please visit the department website for information on other certificates.

Website: http://www.oes.umd.edu

Admissions

This certificate is not currently accepting applications.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	not currently accepting applications	not currently accepting applications
International Applicants		

F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.	not currently accepting applications	not currently accepting applications

Other Deadlines: Please visit the program website at http://www.oes.umd.edu

Requirements

- Transportation Policy and Planning, Post-Baccalaureate Certificate (P.B.C.) (p. 407)

Transportation Policy and Planning, Post-Baccalaureate Certificate (P.B.C.)

This certificate is not currently accepting applications.

Urban Agriculture (Z091)

Graduate Certificate Program
College: Computer, Mathematical, and Natural Sciences

ABSTRACT

The Graduate Certificate in Urban Agriculture (GC-UA) is a 12-credit graduate program that can be completed in twelve months of continuous study. The GC-OSA focuses on the growing of plants and the raising of animals within and around cities. Students acquire the necessary skills to maintain plants and beneficial insects in and around these settings. The program also focuses on the urban ecosystem and urban policies and plans.

Contact

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Website: http://oes-entm.umd.edu/

Courses: ENTM (https://academiccatalog.umd.edu/graduate/courses/entm/)

Relationships: Applied Entomology (MPAE) (p. 46) Beekeeping (Z088) (p. 69) Integrated Pest Management (Z089) (p. 254) Organic and Sustainable Agriculture (Z090) (p. 317) Urban Agriculture (Z091) (p. 407)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (http://gradschool.umd.edu/education/Z069/))

Program-Specific Requirements

- Letters of Recommendation (1)
- Bachelor's degree in a biological field (exceptions can be made with work experience in a biological field and strong letters of recommendation)
- GPA of 3.0 or higher (exceptions can be made with work experience in a biological field and strong letters of recommendation)

***Visa Eligibility:** This program is not eligible for I-20 or DS-2019 issuance by the University of Maryland.

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	August 19, 2022	February 18, 2022
International Applicants		
F (student) or J (exchange visitor) visas; A, E, G, H, I and L visas and immigrants	August 19, 2022	February 18, 2022

RESOURCES AND LINKS:
Program Website: oes-entm.umd.edu (http://oes-entm.umd.edu/)
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Urban Agriculture, Post-Baccalaureate Certificate (P.B.C.) (p. 407)

Urban Agriculture, Post-Baccalaureate Certificate (P.B.C.)

In this 12-credit certificate, students learn the skills required to maintain plants and beneficial insects within and around cities and about the urban ecosystem, policies, and plan

Course	Title	Credits
Required courses:		
ENTM710	Insect Biodiversity, Physiology and Ecology	3
ENTM740	Organic Practices	3
or ENTM730	Plant Diagnostics	
Two additional courses chosen with advisor		6
Total Credits		**12**

Urban Design (Z012)

Graduate Certificate Program
College: Architecture

This certificate is not currently accepting applications. Please visit our graduate program list (p. 19) for information on other programs.

Contact

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Website: http://www.arch.umd.edu

Admissions

This certificate is not currently accepting applications.

Requirements

- Urban Design, Post-Baccalaureate Certificate (P.B.C.) (p. 408)

Urban Design, Post-Baccalaureate Certificate (P.B.C.)

15 credits required

Course	Title	Credits
Required courses:		
ARCH700	Urban Design Studio VII	6
or ARCH407	Graduate Architecture Design IV	
ARCH654	Urban Development and Design Theory	3
Select two of the following:		6
ARCH655	Urban Design Seminar	
ARCH778	Graduate Selected Topics in Urban Design	
ARCH779	Advanced Independent Studies in Urban Design	
Total Credits		**15**

Urban and Regional Planning and Design (URPD)

Graduate Degree Program
School of Architecture, Planning and Preservation

Abstract

The School of Architecture, Planning and Preservation offers a Doctoral Program, the Ph.D. in Urban and Regional Planning and Design. Participating programs include Urban Studies and Planning, Architecture, Historic Preservation, Landscape Architecture, and The National Center for Smart Growth Research and Education. The program prepares students to teach at the university level in departments of Urban Planning, Architecture, Historic Preservation, Real Estate Development, or Landscape Architecture, as well as qualifies graduates to conduct research and participate in high-level decision-making in the public, private, and nonprofit sectors. Intimate and highly competitive, the Ph.D. program offers students a tailored Ph.D. experience and the flexibility to bridge a number of disciplines related to the built environment, including urban planning, design, historic preservation, and real-estate development. Our nationally renowned faculty, the affiliated National Center for Smart Growth Research and Education, and proximity to the architecturally rich, historically significant, and diverse urban fabric of the Mid-Atlantic region make the University of Maryland an exciting place to study urban planning, design, and historic preservation.

Financial Assistance

The School of Architecture, Planning, and Preservation, and The National Center for Smart Growth Research and Education together anticipate three research assistantships available to Doctoral students. Compensation for assistantships includes tuition remission for up to 10 credit hours per semester, plus a stipend. For more information contact the Doctoral Program. Students may also find financial support on faculty research projects and teaching possibilities in the undergraduate and master's programs.

Contact

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School of Architecture, Planning, & Preservation
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Email: hiseki@umd.edu

Website: https://www.arch.umd.edu/programs/phd (https://www.arch.umd.edu/programs/phd/)

Courses: ARCH (https://academiccatalog.umd.edu/graduate/courses/arch/) HISP (https://academiccatalog.umd.edu/graduate/courses/hisp/) RDEV (https://academiccatalog.umd.edu/graduate/courses/rdev/) URSP (https://academiccatalog.umd.edu/graduate/courses/ursp/)

Relationships: National Center for Smart Growth (NCSG) (https://www.umdsmartgrowth.org/), Environmental Finance Center (EFC) (https://arch.umd.edu/research-creative-practice/centers/environmental-finance-center/)

Admissions

GENERAL REQUIREMENTS

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

PROGRAM-SPECIFIC REQUIREMENTS

- Letters of Recommendation (3)
- CV/Resume
- Portfolio PDF Upload (optional)

- Writing Samples (optional, up to 3)
- Description of Research/Work Experience (optional)
- Master's degree in a related field.

The program is highly selective and individualized. Approximately five students will be admitted each year. Students admitted to the Ph.D. program will be expected to have completed a Master's degree in a related field, including but not exclusively urban planning, architecture, historic preservation, or landscape architecture. Students are expected to enter the Ph.D. program with two semesters of graduate-level quantitative research methods. These courses can be taken after the entrance to the program and prior to their advanced methods course.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	January 19, 2022
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 19, 2022

RESOURCES AND LINKS:
Program Website: http://www.arch.umd.edu (http://www.arch.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Requirements

- Urban and Regional Planning and Design, Doctor of Philosophy (Ph.D.) (p. 409)

Urban and Regional Planning and Design, Doctor of Philosophy (Ph.D.)

Doctoral students are required to complete 39 credits, including 12 credits of URSP899.

The Ph.D. in Urban and Regional Planning and Design is a 39-credit program. The program is highly selective and individualized. Approximately five students will be admitted each year. Adequately prepared students will generally need four semesters of formal course work leading to comprehensive exams and all students are required to spend a minimum of two years in residence. The program is designed as a full-time program to be completed in four years.

Students admitted to the doctoral program will be expected to have completed a master's degree in a related field including, but not exclusively, urban planning, architecture, historic preservation, real estate development, or landscape architecture. Students are expected to enter the Ph.D. program with two semesters of graduate level quantitative research methods. These courses can be taken after entrance to the program and prior to their advanced methods course.

Course	Title	Credits
Required courses:		
URSP804	Advanced Planning Theory	3
URSP810	Contemporary Metropolitan Issues	3
URSP805	Seminar in Research Design	3
Advanced Analytical Methods course		3
Select three major field courses		9
Select two minor field courses		6
Dissertation Research Requirements		
URSP899	Doctoral Dissertation Research	12
Total Credits		**39**

Comparative Biomedical Sciences (VMSC)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Department of Veterinary Medicine is under the **College of Agriculture and Natural Resources (AGNR)** at the **University of Maryland** and is home to the Comparative Biomedical Sciences (CBSC) Graduate Program (code: VMSC). The Department of Veterinary Medicine is the Maryland Campus of the **Virginia-Maryland College of Veterinary Medicine**.

The program offers both **Master of Science (M.S.)** and **Doctor of Philosophy (Ph.D.)** degrees. Members of the Comparative Biomedical Sciences Graduate Program faculty specialize in a wide range of research interests in infectious diseases and zoonoses, including cell and molecular biology, microbiology, immunology, virology, and poultry health management and disease prevention.

Financial Assistance

A number of graduate assistantships are available and awarded to candidates with strong academic records.
Teaching Assistantships, Research Assistantships, Scholarships, and Fellowships are available on a competitive basis. Research Assistantships (RAs) are 12-month appointments and Teaching Assistantships (TAs) are 10-month appointments. Benefits for each assistantship include stipends, ten credits of tuition remission per semester, and health benefits. Generally, student assistantships are offered for two years for an M.S. degree and four years for a Ph.D. degree.

Sources of funding include the department; Maryland Agricultural Experiment Station; Maryland Cooperative Extension; College of Agriculture and Natural Resources; Graduate School open-nomination and block grant fellowships (for recruitment of new students only); University diversity fellowships; endowed fellowships; and funds from faculty research contracts and grants. Inquiry about the stipends can be made to the VMSC Graduate Program.

Contact

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Website: https://vetmed.umd.edu/

Courses: VMSC (https://academiccatalog.umd.edu/graduate/courses/vmsc/)

Relationships: Biological Sciences (BISI) (p. 83)

Admissions

General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/education/z069/))

Program-Specific Requirements

- Letters of Recommendation (3)
- Graduate Record Examination (GRE) (optional)
- CV/Resume
- Supplementary Application (optional for Ph.D., not required for M.S.)
- Description of Research/Work Experience (optional for M.S., required for Ph.D.)

Applicants with a minimum degree of **Bachelor of Science (B.S.)** in a biological science or related field of study are eligible for admission to the VMSC Graduate Program, either for Ph.D. or M.S. degree.

A minimum Grade Point Average (GPA) of 3.0 on a 4.0 scale (B or better). Graduate Record Examination (GRE) is optional. Applicants who have GRE scores are encouraged to submit.

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	January 28, 2022	August 5, 2021
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	January 28, 2022	August 5, 2021

RESOURCES AND LINKS:
Program Website: http://vetmed.umd.edu
Application Process: gradschool.umd.edu/admissions/application-process/step-step-guide-applying (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/)

Requirements

- Comparative Biomedical Sciences, Doctor of Philosophy (Ph.D.) (p. 411)
- Comparative Biomedical Sciences, Master of Science (M.S.) (p. 410)

Facilities and Special Resources

The Avrum Gudelsky Veterinary Center, the University of Maryland home of the VMRCVM, lies in the heart of Maryland's thriving biotechnology community and is near Maryland's major university research campuses and government laboratories, including the USDA Beltsville Agriculture Research Center, the National Institutes of Health, and Walter Reed National Military Medical Center. The Center contains 32,000 square feet of research and support laboratories, including animal care facilities. Over 10,000 square-foot research laboratories are fully equipped with state-of-the-art facilities for research on cell biology, molecular biology, microbiology, virology and immunology, including cell culture facilities, ZEISS LSM 800 confocal microscope, fluorescence activated cell sorter, flow cytometer, the Illumina MiSeq System for next-generation sequencing, fluorescence microscopes, Elispot/Fluorospot Reader, and a sophisticated electron microscope suite. Approximately 18,000 square feet of space comprises Biological Safety Level (BSL) 2 and BSL-3+ facilities and ABSL2 and ABSL3 suites for laboratory animals. The poultry unit has 15 rooms, each equipped with 20 poultry isolators to contain any infectious pathogens. The animal facility has a fully equipped necropsy room designed for postmortem analysis.

The Laboratory for Biological Ultrastructure in the Department of Biology is equipped with a transmission and scanning electron microscope, a confocal microscope, ultramicrotomes, and equipment for freeze-fracture studies. The Department of Cell Biology and Molecular Genetics maintains imaging core, genomics core, flow cytometry, and proteomics core. The Fischell Department of Bioengineering maintains the BioWorkshop in A. James Clark Hall at the University of Maryland, which offers access to an array of cutting-edge scientific instruments spanning from biological imaging, cellular and biochemical analysis to biomaterial characterization, and histology. The University of Maryland has the Department of Laboratory Animal Resources (DLAR), a support unit for animal-based research and teaching. Extensive library facilities are available on campus. In addition, the College Park campus is close to the National Agricultural Library (NAL) and the National Library of Medicine (NLM). The Library of Congress and the National Archives, along with several other libraries of biomedical research and academic institutes, are located within a short driving distance.

Computer facilities at the University of Maryland are outstanding. The department provides computer access to all faculty and graduate students. Students are provided with e-mail accounts and free Internet access. The campus maintains both Unix and mainframe systems, and access to supercomputers for specific research projects. Software for graphics, modeling, statistics, and the analysis of molecular data is readily available.

The College Park campus is also ideally situated near a number of federal agencies involved in veterinary medical sciences. Collaborative initiatives are underway with the U.S. Food and Drug Administration's Centers for Veterinary Medicine (CVM) and Food Safety and Applied Nutrition (CFSAN); U.S. Department of Agriculture's Animal and Plant Health Inspection Services (APHIS), Food Safety and Inspection Service (FSIS), Agricultural Research Service (ARS), and Beltsville Agriculture Research Service (BARC); National Institutes of Health (NIH); Walter Reed National Military Medical Center; World Bank; and Pan American Health Organization (PAHO). Scientists from some of these agencies have adjunct appointments with the College of Veterinary Medicine and participate on students' graduate committees.

Comparative Biomedical Sciences, Master of Science (M.S.)

Applicants with a minimum of B.S. or equivalent degree in biological sciences may be admitted to the Master of Science (M.S.) program. The CBSC M.S. program requires a minimum of 30 credits of coursework beyond the B.S. degree, including 6 credits of Master's Thesis Research (VMSC799; credits greater than 6 of this course will not be counted

for degree requirement). A minimum of 12 credits must be earned in coursework at the 600 level or higher. Students must maintain an overall GPA of 3.0 or better in courses taken for graduate credit.

Master program requirements

The plan of study must be approved by the Advisor and the Graduate Admissions and Examination Review Committee before the end of the first semester of enrollment. By the end of the second semester, the student should have an Advisory Committee formed. A thesis based on independent and original research must be submitted to the CBSC Program and the Graduate School. The student must present the thesis in a public seminar and pass a final oral examination given by the Advisory Committee.

The non-thesis Master of Science degree option is available only for doctoral students who wish to leave the graduate program without completing the Ph.D., but have finished all course work required. External applications for the non-thesis master's option are not accepted. One scholarly paper must be written and approved by the student's Advisor.

Course	Title	Credits
BISI712	Responsible Conduct of Research for Biologists	1
VMSC698	One Health Seminar	4
VMSC758	Journal Club in Comparative Biomedical Sciences (Journal Club in Comparative Biomedical Sciences)	4
VMSC799	Thesis Research	6
Restricted Electives (Choose at least 10 credits from courses below):		10
VMSC610	Recombinant Viral Vectors	
VMSC660	Emerging and Re-emerging Infectious Diseases	
VMSC670	Molecular Epidemiology of Infectious Diseases (Molecular Epidemiology of Infectious Diseases)	
VMSC689	Use of Genomics and Proteomics in Infectious Disease	
VMSC720	Viral Pathogenesis	
VMSC760	Immunology of Infectious Diseases	
Additional Credits (from restricted electives or other courses with advisor's approval)		5
Total Credits		**30**

Comparative Biomedical Sciences, Doctor of Philosophy (Ph.D.)

Applicants with a minimum of B.S. or equivalent or a higher degree in biological or medical sciences may be admitted to the Doctor of Philosophy (Ph.D.) program. Students must complete the course requirements of 24 credits (for candidates with B.S. or equivalent degrees) or 12 credits (for candidates with MPH, M.S. or a D.V.M., M.D. or equivalent degrees) in addition to a minimum of 12 dissertation research credits (VMSC899). Students must maintain an overall GPA of 3.0 or better in courses taken for graduate credit per Graduate School policy.

Doctoral program requirements

The plan of study must be approved by the Advisor and Chair of the Graduate Admissions and Examination Review Committee by the end of the first semester of enrollment. By the end of the fourth semester, a student should have completed their core course requirement and present a dissertation research proposal to the Advisory Committee. For entering Ph.D. candidacy, a student must pass a qualifying examination (written and oral) satisfactorily by the end of the sixth semester. A dissertation based on independent and original research must be submitted to the CBSC Program and the Graduate School. The student must present the dissertation in a public seminar and pass a final oral examination given by the Advisory Committee.

For Students with B.S. or Equivalent:

Course	Title	Credits
BISI712	Responsible Conduct of Research for Biologists	1
VMSC698	One Health Seminar	4
VMSC758	Journal Club in Comparative Biomedical Sciences (Journal Club in Comparative Biomedical Sciences)	4
Restricted Electives (Choose at least 10 credits from the following courses):		10
VMSC610	Recombinant Viral Vectors	
VMSC660	Emerging and Re-emerging Infectious Diseases	
VMSC670	Molecular Epidemiology of Infectious Diseases (Molecular Epidemiology of Infectious Diseases)	
VMSC689	Use of Genomics and Proteomics in Infectious Disease	
VMSC720	Viral Pathogenesis	
VMSC760	Immunology of Infectious Diseases	
Additional Credits (from restricted electives or other courses with advisor's approval)		5
VMSC899	Dissertation Research	12
Total Credits		**36**

For Students with M.S. or Equivalent:

Course	Title	Credits
BISI712	Responsible Conduct of Research for Biologists	1
VMSC698	One Health Seminar	2
VMSC758	Journal Club in Comparative Biomedical Sciences (Journal Club in Comparative Biomedical Sciences)	2
Restricted Electives (Choose 7 credits from the following):		7
VMSC610	Recombinant Viral Vectors	
VMSC660	Emerging and Re-emerging Infectious Diseases	
VMSC670	Molecular Epidemiology of Infectious Diseases (Molecular Epidemiology of Infectious Disease)	
VMSC689	Use of Genomics and Proteomics in Infectious Disease	
VMSC720	Viral Pathogenesis	
VMSC760	Immunology of Infectious Diseases	
VMSC899	Dissertation Research	12
Total Credits		**24**

Veterinary Medicine (VMED)

Graduate Degree Program
College: Agriculture and Natural Resources

Abstract

The Virginia-Maryland Regional College of Veterinary Medicine offers a four-year full-time program (curriculum) leading to the Doctor of

Veterinary Medicine (D.V.M.) degree. The first three years are taught at Virginia Tech University in Blacksburg, VA in a case-based and traditional lecture/laboratory format. At the end of the first year, students choose a track - small animal, food animal, equine, mixed species and public/corporate veterinary medicine. Considerable flexibility exists for a student to tailor their curriculum to meet individual needs and interests. The senior year (clinical) is 12 months in length. For detailed information on the Doctor of Veterinary Medicine (DVM) program, please visit the Virginia-Maryland Regional College of Veterinary Medicine at: http://www.vetmed.vt.edu/

Contact

Shelby Jenkins
D.V.M. Program Admissions Coordinator
Virginia-Maryland Regional College of Veterinary Medicine
DVM Admissions Office (0442)
245 Duck Pond Drive
Blacksburg, VA 24061
Telephone: 540.231.4699
Fax: 540.231.9290
Email: dvmadmit@vt.edu

Website: http://www.vetmed.vt.edu

Admissions

For information on applying to the Doctor of Veterinary Medicine (DVM) program, please visit the Virginia-Maryland Regional College of Veterinary Medicine website at: http://www.vetmed.vt.edu

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	see program website	see program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	see program website	see program website

Other Deadlines: Please visit the program website at http://www.vetmed.vt.edu

Requirements

- Veterinary Medicine, Doctor of Veterinary Medicine (D.V.M.) (p. 412)

Veterinary Medicine, Doctor of Veterinary Medicine (D.V.M.)

VA-MD Vet Med's DVM professional curriculum will provide a balanced educational foundation for the varied career opportunities available to veterinary graduates. Our program is designed to develop competent and confident graduates capable of entering the profession with day-one knowledge, skills, and abilities.

- The first two years focus on developing core knowledge, skills, and attributes across the species through integration of the basic and clinical sciences.
- Professional development is fostered through weekly problem-solving sessions focused on clinical reasoning skills.
- At the end of the second year, students enter clinics for the first time and complete five clinical rotations over the summer. This immersion in a workplace-based environment allows students to apply their gained knowledge and skills with real-world experiences.
- In the third year, students return to the classroom to reinforce and build on their acquired knowledge and skills and to focus on an area of interest by way of five tracking options: Small Animal, Equine, Food Animal, Mixed Animal, and Public/Corporate.
- Students finish the last nine months of the DVM program with 12 clinical rotations.

The DVM curriculum is constantly monitored and reviewed by the college's Curriculum Committee and updated as trends in veterinary education emerge.

For more information, please visit: https://dvm.vetmed.vt.edu/about-dvm-program/dvm-curriculum.html (https://dvm.vetmed.vt.edu/about-dvm-program/dvm-curriculum.html)

Wireless Communications (Z120)

Graduate Certificate Program
College: Engineering

ABSTRACT

The aim of the Graduate Certificate in Wireless Communications is to encourage the students to acquire specialized knowledge and skills in the technical area of wireless communications. We have positioned this Certificate to allow the students to further deepen their understanding of wireless communication technologies, and become specialists in this sub-field of telecommunications. While going through the certificate program, students will also acquire/develop additional practical problem-solving and analytical skills and become proficient in using one or more industry-standard RF and wireless network design and testing tools. Typical industry positons our students take after graduation that would benefit from this Certificate include: RF engineer, wireless test engineer, RF analyst, and specialist RAN engineer. (RF stands for radio frequency, and RAN stands for Radio Access Network.)

CONTACT

Master's in Telecommunications Program Office
2433 A.V. Williams Building
8223 Paint Branch Drive
University of Maryland
College Park, MD 20742
Telephone: 301.405.3682
Fax: 301.314.9324
Email: telecomprogram@umd.edu

Website: http://www.telecom.umd.edu (http://www.telecom.umd.edu/)

Courses: ENTS (https://academiccatalog.umd.edu/graduate/courses/ents/)

Admissions

The Certificate in Computing Systems is only available to current Telecommunications (p. 398) students.

Requirements

- Wireless Communications, Post-Baccalaureate Certificate (P.B.C.) (p. 413)

Wireless Communications, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
Complete four of the following courses, with at least two at the 700-level		12
ENTS657	Satellite Communication Systems	
ENTS689	Special Topics in Telecommunications (ENTS689F - Fundamentals of Wireless LANs)	
ENTS689	Special Topics in Telecommunications (ENTS689L - Cellular Network Infrastructure- Cell Site Design and Components)	
ENTS689	Special Topics in Telecommunications (ENTS689W - Short-range Wireless Systems)	
ENTS659	Special Topics in Communications	
ENTS759	Advanced Topics in Communications	
Total Credits		**12**

Women's Studies (WMST)

Graduate Degree Program
College: Arts and Humanities

Abstract

Women's Studies offers an interdisciplinary and integrative program of study leading to the Master of Arts and Doctor of Philosophy degrees. Students will be expected to: develop a thorough grounding in women, gender, and sexuality studies scholarship; acquire an understanding of gender, race, and sexuality as categories of analysis; analyze and assess theories about the role of gender in systems of hierarchy and its intersection with other categories of difference, such as race, ethnicity, religion, class, sexuality, disability, location, and age; develop competence in feminist, queer, and critical race theories, research methods, and pedagogy, including transnational and global issues; and achieve competence in a selected area of specialization.

Financial Assistance

An initial funding offer is provided at the time of admission. Students who enter without a Master's degree are typically guaranteed funding for five years, while students who enter with a Master's degree are typically guaranteed four years. Funding offers typically combine one year of Departmental Fellowship with Graduate Teaching Assistantships for the remaining time. Funding is contingent on satisfactory progress towards the degree and completion of benchmarks.

Contact

Coordinator of Graduate Studies
The Harriet Tubman Department of Women, Gender, and Sexuality Studies
2101 Woods Hall
4302 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6877
Fax: 301.314.9190
Email: wgss@umd.edu

Website: https://wgss.umd.edu/

Courses: WMST

Admissions General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (3)
- CV/Resume
- Writing Sample: 10 pages maximum
- Writing Sample Two* (optional)
- Description of Research/Work Experience (optional)

For more admissions information or to apply to the program, please visit our Graduate School website (https://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/).

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	December 1, 2021
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	December 1, 2021

RESOURCES AND LINKS:
Program Website: https://wgss.umd.edu (https://wgss.umd.edu/)
Application Process: gradschool.umd.edu/admissions (https://gradschool.umd.edu/admissions/)

Other Deadlines: Please visit the program website at

Requirements

- Women's Studies, Doctor of Philosophy (Ph.D.) (p. 414)
- Women's Studies, Master of Arts (M.A.) (p. 414)

Facilities and Special Resources

Resources for research in the College Park and Washington D.C. area are unsurpassed. The University's libraries hold around 2,500,000 volumes. In addition to the outstanding holdings of the Library of Congress, the area also offers the specialized resources of the National Archives and Archives II (located on the grounds of the University of Maryland); the Smithsonian Institution; the National Museum of Women in the Arts; and a broad array of public policy organizations and "think-tanks" plus

the many research and policy institutes that include gender, race, and sexuality issues as part of their agenda. We are also member institution of the Consortium of Universities of the Washington Metropolitan Area, a unique collaboration of D.C. area colleges and universities that promotes cross-institutional learning.

One of the leading scholarly journals in our field, *Feminist Studies*, is located on our campus. Some graduate students may be able to broaden their experience and enhance the applicability and marketability of their coursework by undertaking internships with the journal.

The University of Maryland Consortium on Race, Gender and Ethnicity offers grant-getting potential and otherwise supports the research endeavors of faculty and graduate students in these fields. Grants funded through the Consortium will provide additional funding for Women's Studies graduate students and invaluable research experience. High enrollment demand in Women's Studies introductory core courses provides yet another opportunity for funding graduate students' programs of study with teaching assistantships.

Women's Studies, Master of Arts (M.A.)

Thesis option: 31 credits
Non-thesis option: 31 credits

Women's Studies does not have a stand-alone M.A. program. However, on the way to a Ph.D., students who have completed the appropriate coursework may request conferral of a master's degree. Students will begin the graduate program with a sequence of courses that include the required core interdisciplinary courses for a total of 31 credits and finish with either the completion of a thesis or the 'general' examination. This portion of the program stresses interdisciplinary Master's courses offered in the Department of Women's Studies.

Course	Title	Credits
Required courses:		
WMST601	Approaches to Women's Studies I	3
WMST602	Approaches to Women's Studies II	3
WMST618	Feminist Pedagogy	3
WMST621	Feminist Theories and Women's Movements: Genealogies	3
WMST628	Women's Studies Colloquium	3
Select 16 additional credits		16
Thesis or Non-Thesis Requirements		
Select one of the following:		
Thesis Option:		
Students must pass the General Exam and pass the 2-year paper with an oral defense		
Non-Thesis Option:		
Students must pass the General Exam		
Total Credits		**31**

Women's Studies, Doctor of Philosophy (Ph.D.)

Students entering with a bachelor's degree are required to complete 27 credits of required courses and 27 credits of electives for a total of 54 credits. Students entering with a master's degree are required to complete 27 credits of required courses and 7 credits of electives.

Students in the program explore feminist and queer theories, methodologies, and genealogies through coursework within the department, then draw upon resources across UMD and the DC area to build an individualized course of study as they ready themselves for dissertation research. With the guidance of faculty, students work through our series of benchmarks in order to gain a strong grounding in our field and then develop their specific trajectory, pursuing the classes, networks, and training necessary for the projects they are building.

Advance to Candidacy: In addition to the course requirements below, students must pass all of the following: the General Examination, Interdisciplinary Paper, Portfolio Review, Major Field Exam, and Dissertation Prospectus. Students must also demonstrate reading competency in a language other than English, relevant to their course of study.

Post-Candidacy: Complete at least 12 credits of WMST899 Doctoral Dissertation Research and successfully defend and submit an original dissertation.

Course	Title	Credits
Required courses:		
WMST601	Approaches to Women's Studies I	3
WMST602	Approaches to Women's Studies II	3
WMST618	Feminist Pedagogy	3
WMST621	Feminist Theories and Women's Movements: Genealogies	3
WMST628	Women's Studies Colloquium (1 credit per semester until candidacy)	3
Electives		27
Dissertation Research Requirements		
WMST899	Doctoral Dissertation Research	12
Total Credits		**54**

Women's Studies (Z006)

Graduate Certificate Program
College: Arts and Humanities

Abstract

The Graduate Certificate in Women's Studies is offered to students enrolled in other graduate degree programs at the University of Maryland.

CONTACT

Coordinator of Graduate Studies
Women's Studies
2101 Woods Hall
4302 Chapel Lane
University of Maryland
College Park, MD 20742
Telephone: 301.405.6877
Fax: 301.314.9190
Email: wgss@umd.edu

Website: https://wgss.umd.edu/

Courses: WMST (https://academiccatalog.umd.edu/graduate/courses/wmst/)

Admissions

Please visit the department website for more information.

Application Deadlines

Type of Applicant	Fall Deadline	Spring Deadline
Domestic Applicants		
US Citizens and Permanent Residents	Please visit the program website	Please visit the program website
International Applicants		
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants	Please visit the program website	Please visit the program website

Other Deadlines: Please visit the program website at http://wmst.umd.edu

Requirements

- Women's Studies, Post-Baccalaureate Certificate (P.B.C.) (p. 415)

Women's Studies, Post-Baccalaureate Certificate (P.B.C.)

18 credits required

Please visit the program website (http://wmst.umd.edu/) for more information.

Course	Title	Credits
WMST601	Approaches to Women's Studies I	3
WMST602	Approaches to Women's Studies II	3
WMST621	Feminist Theories and Women's Movements: Genealogies	3
Select nine credits of electives chosen with advisor		9
Total Credits		**18**

World Languages Education (Z095)

Graduate Certificate Program
College: Education

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Website: http://www.education.umd.edu

Admissions

This certificate is not currently accepting applications. Please visit the department website for information on other programs.

Requirements

- World Languages Education, Post-Baccalaureate Certificate (P.B.C.) (p. 415)

World Languages Education, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
TLPL688	Special Topics in Education (TLPL688A)	3
TLPL641	Reading, Cognition, and Instruction: Reading in the Content Areas I	3
TLPL655	Student Assessment in the Second Language Classroom	3
TLPL662	Second Language Acquisition	3
Total Credits		**12**

Youth Experience (Z113)

Graduate Certificate Program
College: Information Studies

Abstract

The Post-Baccalaureate Certificate of Professional Studies in Youth Experience will build the capacity to better adapt to the changing landscape of youth learning and technology. The Post-Baccalaureate Certificate of Professional Studies in Youth Experience prepares librarians to promote 21st century skills among youth ages 0-18 through incorporating participatory design principles, design thinking approaches, and dynamic community partnerships in their offerings of programs and services. At the completion of the online certificate, librarians will be able to:

- Facilitate learning with technology in any physical, virtual or hybrid learning environment using tested skills and practices for different types of youth.
- Methods for engaging youth as co-designers using the design thinking process.
- Demonstrate an understanding of the issues, concepts, and policies related to youth-led learning and programming through libraries.
- Implement best practices to be inclusive of all youth's needs, in particular youth from disadvantaged populations;
- Apply core theories and models from information science and learning sciences to address needs of youth; and
- Partner with other cultural institutions and community organizations to help with youth programming, education, and other projects related to youth development.

CONTACT

Graduate Student Services Office
College of Information Studies
4120 Hornbake Building, South Wing
4130 Campus Drive
College Park, MD 20742
Telephone: 301.405.2038
Fax: 301.314.9145
Email: ischooladvisors@umd.edu

Website: http://ischool.umd.edu

Courses: INST (https://academiccatalog.umd.edu/graduate/courses/inst/)

Admissions
General Requirements

- Statement of Purpose
- Transcript(s)
- TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/))

Program-Specific Requirements

- Letters of Recommendation (1): Letter of recommendation needs to come from a supervisor or someone who can speak to the applicant's capacity for successfully completing the certificate program.
- CV/Resume
- Master's degree in library/information science.
- Current librarian: Must be currently a school or public librarian working with children and teens; or A recent MLIS graduate or librarian who would like additional experience working with children and teens.

All applicants must have:

- Received a four-year baccalaureate degree;
- Received a master's degree in library or information science;
- Earned a minimum GPA of 3.0 (on a 4.0 scale) in all prior undergraduate and graduate course work;
- Must be currently a school or public librarian working with children and teens; or
- A recent MLIS graduate or librarian who would like additional experience working with children and teens
- GRE Scores are NOT required.

Summer Admissions Only

February 16 application deadline (domestic/international students)
Please email yxischool@umd.edu for admissions information.

Application Deadlines

Type of Applicant	Fall Deadline
Domestic Applicants	
US Citizens and Permanent Residents	Please visit the department website
International Applicants	
F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants.New Row	Please visit the department website

Other Deadlines: Please visit the program website at http://ischool.umd.edu

Requirements

- Youth Experience, Post-Baccalaureate Certificate (P.B.C.) (p. 416)

Youth Experience, Post-Baccalaureate Certificate (P.B.C.)

12 credits required

Course	Title	Credits
INST650	Facilitating Youth Learning in Formal and Informal Environments	3
INST651	Promoting Rich Learning with Technology	3
INST652	Design Thinking and Youth	3
INST794	Capstone in Youth Experience	3
Total Credits		**12**

FACULTY LISTING

Last Name	First/Middle Name	Graduate Faculty Status	Academic Credentials	Positions
Abadi	Daniel J.	Full Member	B.S., Brandeis University, 2002; M.Ph., University of Cambridge, 2003; Ph.D., Massachusetts Institute of Technology, 2008	Professor, Computer Science
Abbasi	Hossein	Graduate Teaching	Ph.D., University of Illinois at Urbana-Champaign, 2009	Senior Lecturer, Applied Economics
Abed	Eyad	Full Member	B.S., Massachusetts Institute of Technology, 1979; M.S., University of California-Berkeley, 1981; Ph.D., 1982. GCEN Academic Advisor for Systems Engineering	Professor, Electrical and Computer Engineering Professor, Systems Engineering
Abera	Nicole Taylor	Graduate Teaching	B.S., Bowling Green State University, 2002; M.A., American University, 2007; Ph.D., University of Maryland-College Park, 2014	Lecturer, Special Education
Abraham	Katharine	Full Member	B.S., Iowa State, 1976; Ph.D., Harvard University, 1982.	Professor, Survey and Data Science (online) Professor, Survey Methodology Professor, Survey Statistics
Abshire	Pamela	Full Member	B.S., California Institute of Technology, 1992; M.S., The Johns Hopkins University, 1997; Ph.D., The Johns Hopkins University, 2001.	Professor, Electrical and Computer Engineering Associate Professor, Neurosciences and Cognitive Science Associate Professor, Systems Engineering
Ad-Marbach	Gili	Adjunct Member	Ph.D., Tel-Aviv University, Israel, 1997M.Sc., Tel-Aviv University, Israel, 1988B.Sc., Tel-Aviv University, Israel, 1986	Research Professor
Adams	Jeffrey D.	Full Member	B.A., Johns Hopkins University, 1977; Ph.D., Yale University, 1981.	Associate Chair, Mathematics Professor, Mathematics
Adams	Lowell W.	Associate	B.S., Virginia Polytechnic Institute & State University, 1968; M.S., Ohio State University, 1973; Ph.D., Ohio State University, 1976	University Affiliate, Environmental Science and Technology
Adams	Christopher P	Graduate Teaching	Ph.D., University of Wisconsin-Madison, 2001	Lecturer, Applied Economics
Ades	Ibrahim Z.	Full Member	B.A.,University of California-Los Angeles, 1971; Ph.D., 1976.	Associate Professor, Biological Sciences
Adler	Eric	Full Member	B.A., Connecticut College, 1995; M.A.,SUNY Buffalo,1998; Ph.D., Duke University, 2005.	Associate Professor, Classics

Adomaitis	Raymond A.	Full Member	B.S., Illinois Institute of Technology, 1984;Ph.D., 1988.	Professor, Systems Engineering Professor, Chemical Engineering
Afflerbach	Peter P.	Full Member	B.A., State University of New York-Albany, 1978; M.S., 1979; Ph.D., 1985.	Professor, Teaching and Learning, Policy and Leadership Professor, Curriculum and Instruction
Agarwal	Ritu	Full Member	B.A., University of Delhi, 1982; M.B.A., Indian Institute of Management, Calcutta,1984; M.S., Syracuse University, 1988; Ph.D., Syracuse University, 1988.	Acting Dean
Agashe	Kaustubh	Full Member	B.Tech., Indian Institute of Technology, 1993; Ph.D., University of California, Berkeley, 1998.	Associate Professor, Physics
Aggour	Mohamed S.	Full Member	B.S., Cairo University, 1964;M.S., 1966; Ph.D., University of Washington, 1972.	Professor, Civil and Environmental Engineering
Agrawala	Ashok K.	Full Member	B.S., Agra University, 1960; B.E., Indian Institute of Science-Bangalore, 1963; M.Eng., 1965; Ph.D.,Harvard University, 1970.	Professor, Applied Mathematics & Statistics, and Scientific Computation Professor, Computer Science
Agrawala	Ashok	Full Member	B.S., Agra University, 1960; B.E., Indian Institute of Science-Bangalore, 1963; M.E., Indian Institute of Science-Bangalore, 1965; Ph.D., Harvard University, 1970	Affiliate Professor, Electrical and Computer Engineering
Aguilar Mora	Jorge	Full Member	B.A., Universidad Nacionel de Mexico, 1966; Ph.D., El Colegio de Mexico, 1976	Professor Emeritus, Spanish Language and Literature
Akin	David L.	Full Member	S.B., Massachusetts Institute of Technology, 1974; S.M., 1975; Sc.D., 1981.	Associate Professor, Applied Mathematics & Statistics, and Scientific Computation Associate Professor, Aerospace Engineering
Al-Sheikhly	Mohamad I.	Full Member	B.Sc., University of Baghdad, 1974; Ph.D., University of Newcastle, 1981.	Professor, Materials Science and Engineering Affiliate Professor, Chemical Engineering
Aladangady	Aditya	Graduate Teaching	Ph.D., University of Michigan, 2014	Lecturer, Applied Economics
Alberini	Anna	Full Member	B.A., Italy, 1987; M.A., 1989; Ph.D., University of California-San Diego, 1992.	Professor, Agricultural and Resource Economics
Alcaniz	Isabella	Full Member	Licenciada in IR, Universidad de Belgrano, 1994; MA, Northwestern University, 1999; Ph.D. Northwestern University, 2004	Assistant Professor, Government and Politics

Aldoory	Linda	Full Member	B.A., George Washington University, 1988; M.A., University of Texas-Austin, 1991; Ph.D., Syracuse University, 1998.	Professor, Communication
Alexander	Millard H.	Full Member	B.A., Harvard University, 1964; Ph.D.,University of Paris, 1967.	Distinguished University Professor, Applied Mathematics & Statistics, and Scientific Computation Distinguished University Professor, Chemical Physics Distinguished University Professor, Chemistry
Alexander	Patricia A.	Full Member	B.A., Bethel College-McKenzie, 1970; M.Ed., James Madison University, 1979; Ph.D., University of Maryland-College Park, 1981.	Professor, Human Development
Alford	Charles F.	Full Member	B.A., Austin College, 1969; M.A., University of Texas-Austin, 1971; Ph.D., 1979.	Professor, Government and Politics
Allee	Todd	Full Member	B.A., University of Missouri, 1994; M.S., London School of Economics and Political Science, 1996; Ph.D., University of Michigan, 2003.	Assistant Professor, Government and Politics
Allen	Dale	Adjunct Member	B. S., Iowa State University, 1984; M. S., Florida State University, 1987; Ph. D., University of Maryland, 1996.	Associate Research Scientist, Atmospheric and Oceanic Science
Allewell	Norma M.	Full Member	B.Sc., Biochemistry, McMaster Univ., Hamilton, Ontario, 1965 Ph.D., Molecular Biophysics, Yale University, 1969	Professor, Biological Sciences
Aloimonos	John	Full Member	B.S., University of Athens-Greece,1981; M.S., University of Rochester, 1984; Ph.D., 1987.	Professor, Neurosciences and Cognitive Science Professor, Computer Science
Aloimonos	Yiannis	Full Member	B.S., University of Athens, 1981; M.S., University of Rochester, 1984; Ph.D., University of Rochester, 1987	Affiliate Professor, Electrical and Computer Engineering
Alt	Francis B.	Full Member	B.S.E., Johns Hopkins University, 1967; M.S., Georgia Institute of Technology, 1973; Ph.D., 1977.	Associate Professor, Applied Mathematics & Statistics, and Scientific Computation
Alva	Maria	Graduate Teaching	D.Phil., University of Oxford, 2014	Lecturer, Applied Economics
Alvizu	Josh	Full Member	B.A. University of Colorado, Boulder, 2005; M.A. Johns Hopkins University, 2008; Ph.D., Yale University, 2017	Assistant Professor, German Literature and Language
Ambs	Stefan	Special	Ph.D., University of London, 1997	n/a, Biological Sciences

Amde	Amde M.	Full Member	B.E.S.,Johns Hopkins University, 1970; M.S., University of California-Berkeley, 1971; Ph.D., State University of New York-Buffalo, 1976.	Professor, Civil and Environmental Engineering
Amilivia	Jennifer Marie	Graduate Teaching	B.A., University of Michigan-Ann Arbor, 2009; B.G.S., University of Michigan-Ann Arbor, 2012; M.A., University of Michigan-Ann Arbor, 2014; Ph.D., University of Kansas, 2020	Assistant Clinical Professor, Special Education
Anand	Davinder K.	Full Member	B.S., George Washington University, 1959; M.S., 1961; Ph.D., 1965. GCEN Academic Advisor for Energetic Concepts Development	Professor Emeritus, Mechanical Engineering
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Levin	Daniel	Associate	Ph.D. University of Maryland 2008	Associate Clinical Professor, Teaching and Learning, Policy and Leadership
Levin	Dave	Full Member	B.S., University of Maryland, 2002; Ph.D., University of Maryland, 2012	Affiliate Assistant Professor, Electrical and Computer Engineering
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Levine	William S.	Full Member	B.S., Massachusetts Institute of Technology, 1962; M.S., 1965; Ph.D., 1969.	Professor, Neurosciences and Cognitive Science Research Professor, Electrical and Computer Engineering
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Lung-Amam	Willow	Full Member	BS Stanford, 2000; MCP University of Maryland, 2007; PhD University of California, Berkeley, 2012	Associate Professor, Urban and Regional Planning and Design
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Lynch	Loretta M.	Full Member	B.A., University of California-Davis, 1984; M.S., 1989; Ph.D., University of California-Berkeley, 1996.	Chair, Agricultural and Resource Economics Professor, Agricultural and Resource Economics
Lynch	James P.	Full Member	B.A., 1971; M.A., Wesleyan University, 1975; Ph.D., University of Chicago, 1983.	Research Professor, Criminology and Criminal Justice
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Lyons	Clare A.	Full Member	B.S., Lewis & Clark College, 1980; M.A., University of California-Santa Barbara, 1989; Ph.D., Yale University, 1996.	Associate Professor, History Affiliate Associate Professor, Women's Studies
Lyubchich	Viacheslav	Full Member	MSc, 2008, Orenburg State University of Agriculture, Statistics and Economics; PhD, 2011, Orenburg State University, Statistics	Assistant Research Professor, Applied Mathematics & Statistics, and Scientific Computation
Lyzinski	Vincent	Full	Ph.D., Johns Hopkins University, 2013; M.S.E. Johns Hopkins University, 2011; M.S. Johns Hopkins University, 2007, B.S. University of Notre Dame, 2006	Assistant Professor, Applied Mathematics & Statistics, and Scientific Computation
Ma	Michael	Non-Member	BS, University of Wisconsin - Madison, 1973; MS, University of Wisconsin - Madison, 1975; PhD, University of Wisconsin - Madison, 1978	Professor Emeritus, Entomology
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Mabbs	Linda	Full Member	B.Mus., Northwestern University-Evanston, 1968; M.Mus., 1970.	Professor, Ethnomusicology Professor, Music Professor, Music Education
MacDonald	James M.	Associate	Ph.D., State University of New York at Buffalo, 1983; B.S., Siena College, 1975	Research Professor, Agricultural and Resource Economics
Machado	Carlos	Full Member	Ph.D., University of California, Irvine, 1998	Professor, Biological Sciences
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Maclary	Edward	Full Member	B.Mus., University of Delaware, 1974; M.Mus., Boston University, 1980; D.M.A., Indiana University-Bloomington, 1985.	Associate Director, Ethnomusicology Associate Director, Music Associate Director, Music Education Professor, Ethnomusicology Professor, Music Professor, Music Education
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Marcus	Steven I.	Full Member	B.A., Rice University, 1971; S.M.,Massachusetts Institute of Technology, 1972; Ph.D., 1975.	Professor, Applied Mathematics & Statistics, and Scientific Computation Professor, Systems Engineering Professor Emeritus, Electrical and Computer Engineering
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Masatlioglu	Yusuf	Full Member	Ph.D., New York University, 2005;Master's, New York University, 2001;Master's, Bogazici University, 1990;B.A., Bosphorus University, 1995.	Professor, Economics
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Mathiason	Jessica Lee	Graduate Teaching	B.A. Northwestern University, June 2007; Ph.D. University of Minnesota-Twin Cities, 2017	Lecturer, Women's Studies
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Mayergoyz	Isaak	Full Member	E.E.Dipl., Polytechnical Institute-Novocherkask, 1963; Kandidat, 1968; Doctor, Institute for Cybernetics-Ukranian Academy of Science, 1975.	Professor, Electrical and Computer Engineering Professor, Applied Mathematics & Statistics, and Scientific Computation

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Mazarico	Erwan	Special Member	B.S., Ecole National Superieure de L'aeronauti, 2004; M.S., Massachusetts Institute of Technology, 2004; Ph.D., Massachusetts Institute of Technology, 2008	University Affiliate, Geology
Mazurek	Michelle	Full Member	M.S., Carnegie-Mellon University, 2013; Ph.D., Carnegie-Mellon University, 2014	Associate Professor, Computer Science Affiliate Assistant Professor, Electrical and Computer Engineering
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McCarty	Gregory	Special Member	M.S., Iowa State University, 1985; Ph.D., Iowa State University, 1989	University Affiliate, Environmental Science and Technology
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Wigfield	Allan L.	Full Member	B.S., University of Illinois-Urbana/Champaign, 1974; M.A., 1977; Ph.D., 1982.	Professor, Human Development

Wilberg	Michael	Full Member	B.S., Michigan State University, 1997; M.S., University of Wisconsin - Stevens Point, 2000; Ph.D., Michigan State University, 2005.	Assistant Professor, Marine, Estuarine, and Environmental Sciences
Wilder	Sara	Full Member	B.A. University of California, Davis 2010, M.A. Ohio State University 2013, Ph.D. Ohio State University 2017	Assistant Professor, English Language and Literature
Wilkinson	Gerald S.	Full Member	B.S., University of California-Davis, 1977; Ph.D., University of California-San Diego, 1984.	Professor, Biological Sciences
Williams	Ellen D.	Full Member	B.S., Michigan State University, 1976;Ph.D., California Institute of Technology, 1981. Currently on leave)	Distinguished University Professor, Physics Distinguished University Professor, Chemical Physics
Williams	Daryle	Full Member	AB, Princeton University, 1989; MA, Stanford University, 1991; PhD, Stanford University, 1995	Associate Professor, History
Williams	Carl	Full Member	B.A., Rice University, 1981; Ph.D., University of Chicago, 1987.	Adjunct Professor, Physics University Affiliate, Chemical Physics
Williams	Alexander	Full Member	B.A. Princeton University, 1992; Ph.D. University of Pennsylvania, 2005	Associate Professor, Linguistics Associate Professor, Philosophy
Williams	Roberton III	Full Member	A.B., Harvard College, 1994; Ph.D., Stanford University, 1999	Professor, Agricultural and Resource Economics
Williams	James R.	Full Member	B.S., Santa Clara University, 2002; Ph.D., Harvard University, 2009	Assistant Professor, Physics
Williams	Joseph	Full Member	B.A., Bates College, 2009; MA, Courtauld Institute of Art, History of Art, 2010; PhD, Duke University, Art, Art History & Visual Studies, 2017	Assistant Professor, Architecture Assistant Professor, Urban and Regional Planning and Design
Williams	Michael	Special Member	BA, University of California, Santa Barbara, 1985; MS, University of Maryland, 1993; PhD, University of California, Santa Barbara, 1997	Assistant Research Professor, Entomology
Williams	Stacey C	Graduate Teaching	B.S., University of Delaware, 1993; M.Ed., Loyola University-Maryland, 1997	Senior Lecturer, Special Education
Williams-Forson	Psyche	Full Member	B.A., University of Virginia, 1987; M.A., University of Maryland, 1994; Ph. D., University of Maryland, 2002.	Chair, American Studies Affiliate Associate Professor, Women's Studies
Wilson	Mark E.	Full Member	B.A., University of California-Los Angeles, 1970; M.A., 1972; Ph.D., 1974.	Associate Professor, Ethnomusicology Associate Professor, Music Associate Professor, Music Education

Wilson	Gran	Full Member	B.M., Samford University; M.M., Indiana University–Bloomington	Associate Professor, Ethnomusicology Associate Professor, Music Associate Professor, Music Education
Wilson	Peggy	Associate	Ph.D. University of Maryland	Associate Clinical Professor, Teaching and Learning, Policy and Leadership
Wilson	Sacoby	Full Member	B.S., Alabama Agricultural University, 1998; M.S., University of North Carolina-Chapel Hill, 2000; Ph.D., University of North Carolina-Chapel Hill, 2005	Associate Professor, Environmental Health Sciences
Winkelmann	Allen E.	Full Member	B.S.,University of Minnesota-Twin Cities, 1965; M.S., 1967; Ph.D.,University of Maryland-College Park, 1976.	Associate Professor, Aerospace Engineering
Winter	Susan	Full Member	PhD, University of Arizona	Lecturer, History and Library & Information Science Lecturer, Human-Computer Interaction Lecturer, Information Management Lecturer, Information Studies Lecturer, Library and Information Science
Wiseman	Donna	Full Member	B.S., Oklahoma State University, 1968; M.Ed., Arkansas State University, 1976; Ph.D., University of Missouri-Columbia, 1979.	Professor, Teaching and Learning, Policy and Leadership Professor, Curriculum and Instruction
Wish	Eric D.	Full Member	B.S., University of Massachusetts-Amherst, 1968; Ph.D., Washington University, 1977.	Associate Professor, Criminology and Criminal Justice
Witzleben	J. Lawrence	Full Member	B.A. in Music Theory/History, UC-Santa Barbara; M.A. in Ethnomusicology, University of Hawaii; Certificate of Postgraduate Study in Chinese Music Theory, Shanghai Conservatory of Music; Ph.D. in Ethnomusicology, University of Pittsburgh	Professor, Ethnomusicology Professor, Music Professor, Music Education
Woehl	Taylor	Adjunct Member		Assistant Professor, Chemical Engineering
Wohlfarth	Patrick	Full Member	B.A., University of Maryland, Baltimore County, 2004; M.A., University of North Carolina at Chapel Hill, 2006; Ph.D., University of North Carolina at Chapel Hill, 2010.	Assistant Professor, Government and Politics
Wolfe	Peter	Full Member	B.S., St. Lawrence University, 1959; B.S.E.E., Rensselaer Polytechnic Institute, 1959; M.S., Northwestern University, 1961; Ph.D., New York University, 1965.	Professor Emeritus, Mathematics

Wolniak	Stephen M.	Full Member	B.A., State University of New York-Oswego, 1972; M.S., University of Illinois-Urbana/Champaign, 1974; Ph.D.,University of California-Berkeley, 1979.	Professor, Biological Sciences
Wolpert	Scott A.	Full Member	B.S., Johns Hopkins University,1972; M.S., Stanford University, 1974; Ph.D., 1976.	Chair, Mathematics Distinguished Scholar-Teacher, Mathematics Professor, Mathematics
Wolvin	Andrew D.	Full Member	B.S., University of Nebraska, 1962; M.A.,1963; Ph.D., Purdue University, 1968.	Professor, Communication
Wong	Edlie	Full Member	B.A. University of California, Berkley, 1995; Ph.D., Univeristy of California, 2003.	Professor, English Language and Literature
Wong	Janelle	Full Member	B.A., University of California, Los Angeles, 1995; M.A., Yale University, 1998; Ph.D., Yale University, 2001	Associate Professor, American Studies
Woods	Carly S.	Full Member	B.A., University of Mary Washington, 2004; M.A., University of Pittsburgh, 2006; Ph.D., University of Pittsburgh, 2010	Associate Professor, Communication Affiliate Associate Professor, Women's Studies
Woods	Colleen	Full Member	B.A., University of Michigan, Ann Arbor, 2003; M.A., CUNY Graduate Center, 2006; Ph.D., University of Michigan, Ann Arbor, 2012.	Associate Professor, History
Worthington	Colleen	Non-Member	B.A., University of Maryland-College Park, 1979;M.S., Loyola University of Maryland, 1980	Clinical Professor, Speech Language Pathology
Worthington	Roger L	Full Member	B.A., University of California-Irvine, 1990; M.A., University of Maryland-College Park, 1995; Ph.D., University of Maryland-College Park, 2000	Professor, Counseling Psychology
Wu	Louisa	Non-Member	PhD University of California - San Diego, 1995	Affiliate Professor, Biological Sciences Affiliate Associate Professor, Entomology
Wu	Min	Full Member	B.A., Tsinghua University/ Qinghua University, 1996; B. Elect. Eng., 1996; M.A., Princeton University, 1998; Ph.D., 2001	Professor, Electrical and Computer Engineering
Wu	Ling-Gang	Special Member	M.D., Second Military Medical College, 1985; M.S., Second Military Medical College, 1988; Ph.D., Baylor College of Medicine, 1994	n/a, Biological Sciences
Wuttig	Manfred R.	Full Member	B.S.,Technische Universitat Berlin, 1955; M.S., 1958; Ph.D., 1962.	Professor, Materials Science and Engineering
Wyatt	David M.	Full Member	B.A., Yale University, 1970 Ph.D., University of California-Berkeley, 1975.	Professor, English Language and Literature

Wylie	Ann G.	Full Member	B.A., Wellesley College, 1966; Ph.D., Columbia University, 1972.	Professor Emerita, Geology
Xiao	Shunyuan	Full Member	B.Sc., Huazhong Agricultural University, China, 1984; M.Sc., 1987; Ph.D., 1992.	Professor, Plant Science Affiliate Professor, Biological Sciences
Xiao	Zhengguo	Full Member	D.V.M., Nanjing Agricultural University, 1988; M.S., Nanjing Agricultural University, 1991.	Associate Professor, Animal Sciences
Xie	Min	Full Member	B.A., Beijing University, China 1997; M. A., 2000; Ph.D., SUNY-Albany, 2007.	Professor, Criminology and Criminal Justice
Xie	Yiqun	Full Member	M.S., University of Minnesota-Twin Cities, 2018; Ph.D., University of Minnesota-Twin Cities, 2020	Assistant Professor, Geographical Sciences
Xu	Huan	Full Member	S.B., Harvard University, 2007; Ph.D., California Institute of Technology, 2013, M.S., 2008.	Assistant Professor, Aerospace Engineering
Yager	David D.	Full Member	B.A., Wesleyan University, 1972; Ph.D., Cornell University, 1989.	Associate Professor, Neurosciences and Cognitive Science Associate Professor, Psychology
Yakovenko	Victor M.	Full Member	M.S., Moscow Physical-Technical Institute, 1984; Ph.D., Landau Institute for Theoretical Physics, 1987.	Professor, Physics
Yakubova	Gulnoza	Full Member	B.A., Uzbekistan, 2006; M.S., Purdue University-West Lafayette, 2010; Ph.D, Purdue University, 2013	Assistant Professor, Special Education
Yang	Grace L.	Full Member	B.A., National Taiwan University, 1960; M.A.,University of California-Berkeley, 1963; Ph.D., 1966.	Professor Emerita, Applied Mathematics & Statistics, and Scientific Computation Professor Emerita, Mathematical Statistics Professor Emerita, Mathematics
Yang	Ji Seung	Full Member	B.A., Yonsei University, Seoul, Korea, 2005; M.A., Yonsei University, Seoul, Korea, 2007; Ph.D., University of California, Los Angeles,Department of Education, Graduate School of Education and Information Studies, 2012.	Associate Professor, Measurement, Statistics and Evaluation
Yang	Bao	Full Member	Ph.D. in Mechanical Engineering, University of California, 2003; Ph.D. in Physics, University of Science and Technology of China, 1998	Professor, Mechanical Engineering

Yang	Chenyu	Full Member	B.A., Gustavus Adolphus College, 2010; Ph.D., University of Rochester, 2016.	Assistant Professor, Economics
Yaros	Ron	Full Member	B.A., University of Wisconsin-Madison, 1980; M.A., Webster University, 1991; Ph.D., University of Wisconsin-Madison, 2005.	Associate Professor, Journalism
Yarwood	Stephanie A.	Full Member	B.A. Witman College, 2001 Ph.D. Oregon State Univ. 2007	Associate Professor, Environmental Science and Technology
Yeung	Donald	Full Member	B.S., Stanford University, 1990; M.S., Massachusetts Institute of Technology, 1993; Ph.D., 1997.	Professor, Electrical and Computer Engineering Affiliate Associate Professor, Computer Science
Yi	Moises	Graduate Teaching	Ph.D., University of California-Berkeley, 2016	Lecturer, Applied Economics
Yonkos	Lance	Full Member	B.S., Washington and Lee University. 1986; M.S., University of Maryland, 1999; Ph.D., University of Maryland, 2005.	Associate Professor, Environmental Science and Technology
Yorke	James A.	Full Member	A.B., Columbia University,1963; Ph.D., University of Maryland-College Park, 1966.	Distinguished University Professor, Applied Mathematics & Statistics, and Scientific Computation Distinguished University Professor Emeritus, Mathematics Distinguished University Professor Emeritus, Physics
Yovel	Yossi	Special	B.Sc., Tel-Aviv University, 2004; B.Sc., Tel-Aviv University, 2005; M.Sc., Tel-Aviv University, 2006; Ph.D., University of Tuebingen and Max Planck Institute for Biological Cybernetics, 2008	n/a, Biological Sciences
Yu	Miao	Full Member	Ph.D. Mechanical Engineering University of Maryland, 2002. B.S. & M.S. degrees Engineering Mechanics) Tsinghua University, Beijing, China.	Professor, Mechanical Engineering
Yu	Kenneth H.	Full Member	B.S.,University of California-Berkeley, 1985; M.S., 1988; Ph.D., 1989.	Associate Professor, Aerospace Engineering
Yu	Liangli	Full Member	B.S., China Pharmaceutical University, P.R.China, 1984; M.S., China Pharmaceutical University, P.R. China, 1989; Ph.D., Purdue University, 1999	Professor, Nutrition and Food Science
Yu	Yihua Bruce	Full Member	Ph.D., Johns Hopkins University, 1996.	Associate Professor, Chemical Physics
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Zachariah	Michael R.	Full Member	B.S., University of California, LA, 1979, M.S., University of California, LA, 1981, Ph.D., University of California, LA, 1986	Professor, Applied Mathematics & Statistics, and Scientific Computation Professor, Chemical Engineering Professor, Chemistry Affiliate Professor, Materials Science and Engineering
Zaki	Mary	Full Member	B.A., University of Pennsylvania, 2003; B.S., University of Pennsylvania, 2003; M.A., Northwestern University, 2008; Ph.D., Northwestern University, 2014.	Assistant Professor, Agricultural and Resource Economics
Zakim	Eric S.	Full Member	B.A., Oberlin College, 1982; M.A. University of California-Berkeley, 1989; Ph.D., 1996.	Associate Professor, Jewish Studies Associate Professor, Comparative Literature
Zalewski	Chris	Non-Member	B.A., University of Maryland, M.A., University of Maryland, Ph.D., Gallaudet University	Lecturer, Clinical Audiology
Zambrana	Ruth Enid	Full Member	B.A., CUNY-Queens College, 1969; M.S.W., University of Pennsylvania, 1971; Ph.D., Boston University, 1977.	Professor, Women's Studies Affiliate Professor, Sociology
Zanotti	Laura	Special Member	Ph.D. 2008, M.A. 2004 University of Washington; B.A. 2001 Colgate University	Research Professor, Anthropology
Zelkowitz	Marvin V.	Full Member	B.S., Rensselaer Polytechnic Institute, 1967; M.S., Cornell University, 1969; Ph.D., 1971.	Professor Emerita, Computer Science
Zeller	Thomas G.	Full Member	M.A., University of Munich, 1995; Ph.D., 1999.	Associate Professor, History
Zeng	Ning	Full Member	B.S., University of Science and Technology-China, 1987: M.S., University of Arizona, 1991; Ph.D., University of Arizona, 1995.	Professor, Atmospheric and Oceanic Science Affiliate Associate Professor, Geology
Zer Boudet	Ilknur	Graduate Teaching	Ph.D., London School of Economics, 2013	Lecturer, Applied Economics
Zhang	Da-Lin	Full Member	B.S., University of Science & Technology-China, 1976; M.S., The Pennsylvania State University, 1981; Ph.D., 1985.	Professor, Applied Mathematics & Statistics, and Scientific Computation Professor, Atmospheric and Oceanic Science
Zhang	Guangming	Full Member	B.S., Tianjin University-P.R.C., 1966; M.S., 1981; M.S., University of Illinois-Urbana/Champaign, 1983; Ph.D., 1986.	Associate Professor, Mechanical Engineering Associate Professor, Systems Engineering
Zhang	Lei	Full Member	B.S., Tsinghua University, 2000; M.S., University of Minnesota, 2002, 2005; Ph.D., University of Minnesota, 2006.	Associate Professor, Civil and Environmental Engineering

Zhang	Yanjin	Full Member	D.V.M, Shandong Agricultural University, China, 1984; M.S., China Institute of Veterinary Drug Control,1989; Ph.D., Iowa State University, IA, 1998.	Director, Veterinary Medical Sciences Associate Professor, Veterinary Medical Sciences Affiliate Associate Professor, Biological Sciences
Zhang	Yunfeng	Full Member	B.S., Tongji University, 1993; M.S., Tsinghua University, 1996; Ph.D. California Institute of Technology, 2001.	Associate Professor, Civil and Environmental Engineering
Zhang	Ting	Full Member	B.A., Peking University, 2004; M.A. Peking University, 2007; Ph.D., Johns Hopkins University, 2014.	Associate Professor, History
Zhang	Li-Qun	Full Member	B.S., Tsinghua University, 1982; M.S., Vanderbilt University, 1988; Ph.D., Vanderbilt University, 1990	Professor, Bioengineering
Zhang	Jing	Full Member	B.S., China Agricultural University, 2009; M.S., University of Minnesota, 2011; Ph.D., University of Minnesota, 2014	Assistant Professor, Applied Mathematics & Statistics, and Scientific Computation
Zhang	Ye	Graduate Teaching	Ph.D., University of Maryland at College Park, 2007	Lecturer, Applied Economics
Zheng	Quanan	Adjunct Member	B.S.,Jilin University, China, 1966; Ph.D., Chinese Academy of Sciences, China, 1987.	Senior Research Scientist, Atmospheric and Oceanic Science
Zhou	Naijun	Full Member	Ph.D, GIScience, University of Wisconsin- Madison, 2005	Lecturer, Geospatial Information Science (with Nanjing Normal University) Lecturer, Geospatial Information Sciences Lecturer, Geospatial Information Sciences
Zhu	Xiaoping	Full Member	D.V.M., Ningxia University, China, 1984; M.S., China Agricultural University, 1987; Ph.D., University of Wisconsin-Madison, 1997.	Associate Dean, Veterinary Medical Sciences Chair, Veterinary Medical Sciences Professor, Veterinary Medical Sciences Affiliate Professor, Biological Sciences
Zhu	Wenlu	Full Member	B.S., Peking University, 1986; M.S., 1989; Ph.D., SUNY-Stony Brook, 1996.	Professor, Geology Associate Professor, Applied Mathematics & Statistics, and Scientific Computation
Zhu	Jianhua	Full Member	B.S., Anhui Institute of Education, China, 1998; Ph.D., Purdue Univeristy, 2004.	Associate Professor, Plant Science
Zhu	Shanjiang	Special Member	B.S., Tsinghua University, 2003; M.S., Tsinghua University/Ecole Centrale de Nantes, 2005; M.S., University of Minnesota, 2012; Ph.D., University of Minnesota, 2010	Associate Professor, Civil and Environmental Engineering

Zickert	Christian	Full Member	Ph.D., Columbia University, 2008	Assistant Professor, Mathematics
Ziegler	Delores	Full Member	B.M., Maryville College, 1973; M.M. The University of Tennessee, 1978	Professor, Ethnomusicology Professor, Music Professor, Music Education
Ziegler	Susan	Special	B.S., University of Massachusetts at Amherst, 1993; Ph.D., University of Texas at Austin, 1998.	University Affiliate, Geology
Zilfi	Madeline C.	Full Member	B.A., Mount Holyoke College, 1964; M.A.,University of Chicago, 1971; Ph.D., 1976.	Professor, History Affiliate Professor, Jewish Studies Affiliate Professor, Women's Studies
Zimin	Alexey	Full Member	Ph.D., University of Maryland College Park, 2003.	Associate Research Professor, Applied Mathematics & Statistics, and Scientific Computation
Zimmer	Elizabeth	Adjunct Member	B.S., Cornell University, 1973; Ph.D., University of California-Berkeley, 1981.	Adjunct Professor, Biological Sciences
Zimmerman	Daniel J.	Adjunct Member	B.A., Yale University; M.A., Ph.D., University of Chicago	Lecturer, Ethnomusicology Lecturer, Music Lecturer, Music Education
Zimmerman	Paul	Graduate Teaching	Ph.D., Florida State University, 2000	Lecturer, Applied Economics
Zou	Haibo	Special Member	B.S., Nanjing Normal University, 1986; M.S., Nanjing Normal University, 1989; Ph.D., Florida State University, 1999	University Affiliate, Geology
Zou	Linda	Full Member	B.A., College of William & Mary, 2012; Ph.D., University of Washington, 2019.	Assistant Professor, Psychology
Zukowski	Andrea	Full Member	B.A., Wayne State University; Ph.D., Boston University, 2001.	Assistant Research Scientist, Linguistics
Zupan	Marcus	Special Member	B.E., University of Dayton, 1995; M.S., Johns Hopkins University, 1997; Ph.D., Johns Hopkins University, 2000.	Professor, Civil and Environmental Engineering
Zwicker	Matthias	Full Member	M.S., Switzerland, 1998; Ph.D., Switzerland, 2003	Professor, Computer Science
Šrámek	Ondřej	Special Member	B.S., Charles University in Prague, 2000; M.S., Charles University in Prague, 2002; M.Phil., Yale University, 2006; Ph.D., École Normale Supérieure de Lyon (France) & Charles University in Prague, 2007.	University Affiliate, Geology

COURSE LISTING

A

- AASP - African American Studies (p. 595)
- AAST - Asian American Studies (p. 596)
- AGNR - Agriculture and Natural Resources (p. 596)
- AMSC - Applied Mathematics & Scientific Computation (p. 597)
- AMST - American Studies (p. 599)
- ANSC - Animal Science (p. 600)
- ANTH - Anthropology (p. 602)
- AOSC - Atmospheric and Oceanic Science (p. 609)
- ARAB - Arabic (p. 614)
- ARCH - Architecture (p. 614)
- AREC - Agricultural and Resource Economics (p. 619)
- ARHU - Arts and Humanities (p. 622)
- ARMY - Army (p. 623)
- ARSC - Air Science (p. 623)
- ARTH - Art History & Archaeology (p. 623)
- ARTT - Art Studio (p. 625)
- ASTR - Astronomy (p. 626)

B

- BCHM - Biochemistry (p. 628)
- BEES - Behavior, Ecology, Evolution and Systematics (p. 629)
- BERC - Center for Study of Business, Ethics, Regulation, Crime (p. 629)
- BIOE - Bioengineering (p. 630)
- BIOL - Biology (p. 634)
- BIOM - Biometrics (p. 635)
- BIPH - Biophysics (p. 636)
- BISI - Biological Sciences (p. 636)
- BMGT - Business and Management (p. 636)
- BSCI - Biological Sciences Program (p. 644)
- BSOS - Behavioral and Social Sciences (p. 647)
- BSST - Terrorism Studies (p. 647)
- BUAC - Accounting and Information Assurance (https://academiccatalog.umd.edu/graduate/courses/buac/)
- BUDT - Decision and Information Technologies (p. 648)
- BUFN - Finance (p. 650)
- BULM - Logistics, Business, and Public Policy (p. 655)
- BUMK - Marketing (p. 657)
- BUMO - Management and Organization (p. 660)
- BUSI - Part-Time MBA Program (p. 662)
- BUSM - Full-Time MBA Program (p. 668)

C

- CBMG - Cell Biology & Molecular Genetics (p. 674)
- CCJS - Criminology and Criminal Justice (p. 674)
- CHBE - Chemical and Biomolecular Engineering (p. 677)
- CHEM - Chemistry (p. 682)
- CHIN - Chinese (p. 683)
- CHPH - Chemical Physics (p. 685)
- CLAS - Classics (p. 685)
- CLFS - Chemical and Life Sciences (p. 685)
- CMLT - Comparative Literature (p. 686)
- CMSC - Computer Science (p. 687)
- COMM - Communication (p. 695)
- CONS - Sustainable Development & Conservation Biology (p. 702)

D

- DANC - Dance (p. 702)
- DATA - Data (https://academiccatalog.umd.edu/graduate/courses/data/)

E

- ECON - Economics (p. 704)
- EDCI - Curriculum and Instruction (p. 714)
- EDCP - Education Counseling and Personnel Services (p. 716)
- EDHD - Education, Human Development (p. 721)
- EDHI - Education Leadership, Higher Ed and International Ed (p. 727)
- EDMS - Measurement, Statistics, and Evaluation (p. 730)
- EDPS - Education Policy Studies (p. 732)
- EDSP - Education, Special (p. 732)
- EDUC - Education (p. 740)
- EMBA - Executive MBA Program (p. 741)
- ENAE - Engineering, Aerospace (p. 744)
- ENCE - Engineering, Civil (p. 749)
- ENCH - Engineering, Chemical (p. 755)
- ENEE - Electrical & Computer Engineering (p. 757)
- ENES - Engineering Science (p. 765)
- ENFP - Engineering, Fire Protection (p. 768)
- ENGL - English (p. 771)
- ENMA - Engineering, Materials (p. 778)
- ENME - Engineering, Mechanical (p. 786)
- ENNU - Engineering, Nuclear (p. 794)
- ENPM - Engineering, Professional Masters (p. 795)
- ENPP - Engineering and Public Policy (p. 801)
- ENRE - Reliability Engineering (p. 801)
- ENSE - Systems Engineering (p. 803)
- ENSP - Environmental Science and Policy (p. 804)
- ENST - Environmental Science and Technology (p. 805)
- ENTM - Entomology (p. 810)
- ENTS - Telecommunications (p. 811)
- EPIB - Epidemiology and Biostatistics (p. 813)

F

- FILM - Film Studies (p. 817)
- FMSC - Family Science (p. 818)
- FOLA - Foreign Language (p. 822)
- FREN - French (p. 822)

G

- GEOG - Geographical Sciences (p. 824)
- GEOL - Geology (p. 832)

- GERM - Germanic Studies (p. 837)
- GREK - Greek (p. 839)
- GVPT - Government and Politics (p. 839)

H

- HACS - ACES-Cybersecurity (p. 845)
- HEBR - Hebrew (p. 845)
- HESI - Higher Ed, Student Affairs, and International Ed Policy (p. 845)
- HESP - Hearing and Speech Sciences (p. 846)
- HISP - Historic Preservation (p. 852)
- HIST - History (p. 853)
- HLHP - Health and Human Performance (p. 858)
- HLMN - Hillman Entrepreneurs Program (p. 858)
- HLSA - Health Services Administration (p. 858)
- HLTH - Health (p. 862)

I

- IMMR - Immigration Studies (p. 865)
- INFM - Information Management (p. 865)
- INST - Information Studies (p. 867)
- ISRL - Israel Studies (p. 877)
- ITAL - Italian (p. 878)

J

- JAPN - Japanese (p. 878)
- JOUR - Journalism (p. 879)
- JWST - Jewish Studies (p. 884)

K

- KNES - Kinesiology (p. 886)
- KORA - Korean (p. 890)

L

- LARC - Landscape Architecture (p. 891)
- LASC - Certificate in Latin American Studies (p. 893)
- LATN - Latin (p. 893)
- LBSC - Library Science (p. 894)
- LGBT - Lesbian Gay Bisexual Transgender Studies (p. 896)
- LING - Linguistics (p. 897)

M

- MAIT - Masters in the Mathematics of Advanced Industrial Tech (p. 899)
- MATH - Mathematics (p. 900)
- MEES - Marine-Estuarine-Environmental Sciences (p. 905)
- MIEH - Maryland Institute for Applied Environmental Health (p. 907)
- MITH - Maryland Institute for Technology in the Humanities (p. 910)
- MLAW - MPower Undergraduate Law Programs (p. 910)
- MOCB - Molecular and Cell Biology (p. 910)
- MSML - Machine Learning (https://academiccatalog.umd.edu/graduate/courses/msml/)
- MUED - Music Education (p. 910)
- MUSC - School of Music (p. 912)
- MUSP - Music Performance (p. 918)

N

- NACS - Neuroscience & Cognitive Science (p. 918)
- NAVY - Navy (p. 919)
- NFSC - Nutrition and Food Science (p. 919)

P

- PERS - Persian (p. 922)
- PHIL - Philosophy (p. 922)
- PHSC - Public Health Science (p. 924)
- PHYS - Physics (p. 925)
- PLCY - Public Policy (p. 929)
- PLSC - Plant Sciences (p. 933)
- PORT - Portuguese (p. 937)
- PSYC - Psychology (p. 937)
- PUAF - Public Policy (p. 945)

R

- RDEV - Real Estate Development (p. 945)
- RELS - Religious Studies (p. 947)
- RUSS - Russian (p. 947)

S

- SLAA - Second Language Acquisition and Application (p. 948)
- SLLC - School of Languages, Literatures and Cultures (p. 950)
- SOCY - Sociology (p. 951)
- SPAN - Spanish (p. 956)
- SPHL - Public Health (p. 959)
- STAT - Statistics and Probability (p. 961)
- SURV - Survey Methodology (p. 963)

T

- TDPS - Theatre, Dance and Performance Studies (p. 970)
- THET - Theatre (p. 970)
- TLPL - Teaching and Learning, Policy and Leadership (p. 975)
- TLTC - Teaching and Learning Transformation Center (p. 991)
- TOXI - Toxicology (p. 991)

U

- UMEI - Maryland English Institute (p. 991)
- UNIV - University Courses (p. 992)
- URSP - Urban Studies and Planning (p. 992)
- USLT - Latina/o Studies (p. 993)

V

- VMSC - Veterinary Medical Sciences (p. 994)

W

- WGSS - Women, Gender and Sexuality Studies (https://academiccatalog.umd.edu/graduate/courses/wgss/)
- WMST - Women's Studies (p. 995)

AASP - African American Studies

AASP400 Directed Readings in African American Studies (3 Credits)
The readings will be directed by the faculty of African American Studies. Topics to be covered will be chosen to meet the needs and interests of individual students.
Prerequisite: AASP202 or AASP100.

AASP401 Research Directions in African-American Studies (3 Credits)
Utilizing a pro seminar format, this course offers an overview of recent research on the experiences of African Americans and the African diaspora. The course will cover selective topics from research portfolios of department faculty related to the status of African Americans and the diaspora across a number of topics. Students will read recent original research studies and discuss with the authors both the theoretical underpinnings of the research, the methods and evaluate the interpretations. This course fulfills the capstone requirement for African American studies majors and certificate students by providing an opportunity to consolidate and integrate a range of ideas encountered in the curriculum.
Restriction: Must have earned a minimum of 90 credits; and must be major in African-American Studies.

AASP402 Classic Readings in African American Studies (3 Credits)
Classic readings of the social, economic and political status of blacks and other minorities in the United States and the Americas.
Prerequisite: AASP202 or AASP100.

AASP411 Black Resistance Movements (3 Credits)
A comparative study of the black resistance movements in Africa and America; analysis of their interrelationships as well as their impact on contemporary pan-Africanism.
Prerequisite: AASP100.

AASP441 Science, Technology, and the Black Community (3 Credits)
Scientific knowledge and skills in solving technological and social problems, particularly those faced by the black community. Examines the evolution and development of African and African American contributions to science. Surveys the impact of technological changes on minority communities.
Prerequisite: HIST255, AASP202, or AASP100; or permission of BSOS-African American Studies department.

AASP443 Blacks and the Law (3 Credits)
The relationship between black Americans and the law, particularly criminal law, criminal institutions and the criminal justice system. Examines historical changes in the legal status of blacks and changes in the causes of racial disparities in criminal involvement and punishments.
Prerequisite: HIST255, AASP202, or AASP100; or permission of BSOS-African American Studies department.

AASP468 Special Topics in Africa and the Americas (3 Credits)
Cultural, historical and artistic dimensions of the African experience in Africa and the Americas.
Repeatable to: 6 credits if content differs.

AASP478 Humanities Topics in African American Studies (3 Credits)
Advanced studies in the humanities, often requiring prerequisites, focusing on the literary, artistic and philosophical contributions of Africans and African Americans.
Repeatable to: 6 credits if content differs.

AASP493 Feminist and Nationalist Thought in Black Communities (3 Credits)
The historical and theoretical foundations of feminist and nationalist thought in Black Communities will be examined. Further, we will discover why feminist and nationalist thought has been routinely ignored or misrepresented as disparate, if not oppositional, themes in Black intellectual and political life.
Prerequisite: AASP101 or AASP100.
Credit Only Granted for: AASP493 or AASP499W.
Formerly: AASP499W.

AASP498 Special Topics in Black Culture (3 Credits)
Advanced study of the cultural and historical antecedents of contemporary African and African American society. Emphasis on the social, political, economic and behavioral factors affecting blacks and their communities. Topics vary.
Prerequisite: AASP202 or AASP100.
Repeatable to: 6 credits if content differs.

AASP499 Advanced Topics in Public Policy and the Black Community (3 Credits)
Examination of specific areas of policy development and evaluation in black and other communities. Application of advanced tools of policy analysis, especially quantitative, statistical and micro-economic analysis.
Prerequisite: AASP301; or permission of BSOS-African American Studies department.
Repeatable to: 6 credits if content differs.

AASP602 Interdisciplinary Research Methods in Afro-American Studies (3 Credits)
The purpose of this course is to familiarize graduate students with both the interdisciplinary and multidisciplinary approaches that academics employ when producing scholarship in the field of Afro-American Studies. This will examine the contours of the field with an emphasis on work in both the social sciences and the arts and humanities.
Restriction: Permission of BSOS-African American Studies department; or permission of EDUC-Education Policy and Leadership department.

AASP611 Classic Texts and Contemporary Issues (3 Credits)
Through a review and analysis of classic texts of Black intellectuals, artists, writers, and activists, students will examine the compelling themes in African American life and scholarship.
Restriction: Permission of BSOS-African American Studies department.

AASP621 Public Policy and Black Communities (3 Credits)
This course explores the role of race in social policy formation and emphasizes the importance of both political institutions and economic relations as determinants of the policy making process and context.
Restriction: Permission of BSOS-African American Studies department.

AAST - Asian American Studies

AAST420 Asian American Women: The Social Construction of Gender (3 Credits)
Examines the intersection of gender, race and class as it relates to Asian American women in the United States; how institutionalized cultural and social statuses of gender, race, ethnicity and social class produce and reproduce inequality with implications for Asian Americans and the broader society.
Restriction: Must not have completed WMST420. Cross-listed with WMST420 .
Credit Only Granted for: AAST420 or WMST420.

AAST421 Asian American Public Policy (3 Credits)
Using Asian Pacific Americans as a case study, this course will analyze the development of public policy in America. Each week, topics such as community development, voting rights, and the movement to redress the wartime internment of Japanese Americans will serve as backdrops for discussion. We will explore the policy-making roles of legislators, judges, local and national political leaders, journalists, writers, unions, social movements, and community organizations.Cross-listed with: AMST418N.
Credit Only Granted for: AAST421, AAST498M or AMST418N.
Formerly: AAST498M.

AAST424 Sociology of Race Relations (3 Credits)
Analysis of race-related issues, with a primary focus on American society. The historical emergence, development, and institutionalization of racism; the impact of racism on its victims; and racially based conflict.
Prerequisite: 6 credits in SOCY courses; or permission of UGST-Undergraduate Studies. Cross-listed with: SOCY424.
Credit Only Granted for: AAST424 or SOCY424.

AAST443 Asian American Politics (3 Credits)
Students will gain a greater understanding of 1)the role of Asian Americans in US politics, 2) the political attitudes and behaviors of Asian Americans and 3)how to conduct research on Asian American politics. Though the class will concentrate on Asian Americans, issues related to Asian American politics will be examined within the larger context of America's multicultural political landscape.Cross-listed with: AMST498J.
Credit Only Granted for: AAST498T, AAST443, GVPT368C or AMST 498J.
Formerly: AAST498T.

AAST498 Advanced Topics in Asian American Studies (3 Credits)
Advanced study of the cultural and historical antecedents of contemporary Asian American society. Emphasis on the social, political, economic, and behavioral factors affecting Asian Americans and their communities.
Repeatable to: 6 credits if content differs.

AAST499 Senior Thesis (3 Credits)
Under the supervision of faculty, research regarding a specific topic of the Asian American experience will be completed.
Prerequisite: AAST201 and AAST200.
Restriction: Permission of UGST-Undergraduate Studies; and must be in Asian American Studies program.
Repeatable to: 6 credits if content differs.

AGNR - Agriculture and Natural Resources

AGNR489 Field Experience (1-4 Credits)
Credit according to time scheduled and organization of the course. A lecture series organized to study in depth a selected phase of agriculture not normally associated with one of the existing programs.
Restriction: Permission of AGNR-College of Agriculture & Natural Resources.
Repeatable to: 4 credits if content differs.
Formerly: AGRI489.

AGNR499 Special Problems (1-3 Credits)
Formerly: AGRI499.

AGNR606 Program Planning and Evaluation in Agricultural Education (2-3 Credits)
Second semester. Analysis of community agricultural education needs, selection and organization of course content, criteria and procedures for evaluating programs.
Formerly: AGRI606.

AGNR630 Teaching-Learning in Adult and Continuing Education (3 Credits)
The teaching/learning process in adult continuing education. Instructional techniques and methodologies appropriate for adults. The curriculum development process. Issues and priorities in adult continuing education.
Formerly: AGRI630.

AGNR661 Rural Community Analysis (3 Credits)
Communities as social systems composed of organizations which interact in a system of cultural institutions, norms, and values. Functional and structural linkages between organizations within as well as outside the community; rural vs. urban similarities and differences; and the role of the social processes such as competition, cooperation and conflict in the context of community power and leadership structure.
Formerly: AGRI661.

AGNR699 Special Problems (1-3 Credits)
Formerly: AGRI699.

AGNR789 Special Topics (1-3 Credits)
Repeatable to: 9 credits if content differs.
Formerly: AGRI789.

AGNR798 Seminar in Rural Education (1-3 Credits)
Problems in the organization, administration, and supervision of the several agencies of rural and/or vocational education.
Repeatable to: 8 credits if content differs.
Formerly: AGRI798.

AGNR799 Master's Thesis Research (1-6 Credits)
Formerly: AGRI799.

AGNR888 Apprenticeship in Education (1-8 Credits)
Apprenticeships in the major area of study are available to selected students whose application for an apprenticeship has been approved by the education faculty. Each apprentice is assigned to work for at least a semester full-time or the equivalent with an appropriate agency. The sponsor of the apprentice maintains a close working relationship with the apprentice and the other persons involved.
Prerequisite: Must have completed 6 credits in Education at the University of Maryland.
Restriction: Must have experience and must have a master's degree.
Formerly: AGRI888.

AGNR889 Internship in Education (3-8 Credits)
Internships in the major area of study for experienced students who are assigned to an appropriate school system, educational institution, or agency in a situation different than that in which the student is regularly employed.
Formerly: AGRI889.

AGNR899 Doctoral Dissertation Research (1-8 Credits)
Formerly: AGRI899.

AMSC - Applied Mathematics & Scientific Computation

AMSC420 Mathematical Modeling (3 Credits)
The course will develop skills in data-driven mathematical modeling through individual and group projects. Emphasis will be placed on both analytical and computational methods, and on effective oral and written presentation of results.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461); and 1 course with a minimum grade of C- from (MATH241, MATH340); and 1 course with a minimum grade of C- from (MATH246, MATH341); and minimum grade of C- in STAT400. And 1 course with a minimum grade of C- from (CMSC106, CMSC131); or students who have taken courses with comparable content may contact the department. Cross-listed with MATH420.
Credit Only Granted for: AMSC420 or MATH420.

AMSC460 Computational Methods (3 Credits)
Basic computational methods for interpolation, least squares, approximation, numerical quadrature, numerical solution of polynomial and transcendental equations, systems of linear equations and initial value problems for ordinary differential equations. Emphasis on methods and their computational properties rather than their analytic aspects. Intended primarily for students in the physical and engineering sciences.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241); and 1 course with a minimum grade of C- from (CMSC106, CMSC131); and minimum grade of C- in MATH246. Also offered as: CMSC460.
Credit Only Granted for: AMSC460, CMSC460, AMSC466, or CMSC466.

AMSC466 Introduction to Numerical Analysis I (3 Credits)
Floating point computations, direct methods for linear systems, interpolation, solution of nonlinear equations.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241); and 1 course with a minimum grade of C- from (CMSC106, CMSC131); and minimum grade of C- in MATH410. Also offered as: CMSC466.
Credit Only Granted for: AMSC460, CMSC460, AMSC466, or CMSC466.

AMSC498 Selected Topics in Applied Mathematics (1-3 Credits)
Topics in applied mathematics of special interest to advanced undergraduate students.
Repeatable to: 6 credits if content differs.

AMSC660 Scientific Computing I (3 Credits)
Monte Carlo simulation, numerical linear algebra, nonlinear systems and continuation method, optimization, ordinary differential equations. Fundamental techniques in scientific computation with an introduction to the theory and software of each topic.
Prerequisite: Must have knowledge of C or Fortran. And AMSC460 or CMSC460; or (CMSC466 or AMSC466); or (must have knowledge of basic numerical analysis (linear equations, nonlinear integration, interpolation); and permission of instructor). Cross-listed with CMSC66 0.
Credit Only Granted for: AMSC660 or CMSC660.

AMSC661 Scientific Computing II (3 Credits)
Fourier and wavelet transform methods, numerical methods for elliptic partial differential equations, numerical linear algebra for sparse matrices, Finite element methods, numerical methods for time dependent partial differential equations. Techniques for scientific computation with an introduction to the theory and software for each topic. Course is part of a two course sequence (660 and 661), but can be taken independently.
Prerequisite: Must have knowledge of C or Fortran. And CMSC466, AMSC466, AMSC460, or CMSC460; or (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Cross-listed with: CMSC661.
Credit Only Granted for: AMSC661 or CMSC661.

AMSC662 Computer Organization and Programming for Scientific Computing (3 Credits)
This course presents fundamental issues of computer hardware, software, parallel computing, and scientific data management for programming for scientific computation.
Prerequisite: Must have knowledge of C or Fortran; and (AMSC460, AMSC466, CMSC460, or CMSC466). And (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Cross-listed with CMSC66 2.
Credit Only Granted for: AMSC662 or CMSC662.

AMSC663 Advanced Scientific Computing I (3 Credits)
In the sequence Advanced Scientific Computing I & Advanced Scientific Computing II, (AMSC663/CMSC663 and AMSC664/CMSC664, respectively) students work on a year-long individual project to develop software for a scientific task in a high performance computing environment. Lectures will be given on available computational environments, code development, implementation of parallel algorithms.
Prerequisite: CMSC660 or AMSC660; and (CMSC661 or AMSC661).
Restriction: Permission of instructor. Cross-listed with CMSC663.
Credit Only Granted for: AMSC663 or CMSC663.

AMSC664 Advanced Scientific Computing II (3 Credits)
In the sequence Advanced Scientific Computing I & Advanced Scientific Computing II, (AMSC663/CMSC663 and AMSC664/CMSC664, respectively) students work on a year-long individual project to develop software for a scientific task in a high performance computing environment. Lectures will be given on available computational environments, code development, implementation of parallel algorithms.
Prerequisite: AMSC663 or CMSC663.
Restriction: Permission of instructor. Cross-listed with CMSC664.
Credit Only Granted for: AMSC664 or CMSC664.

AMSC666 Numerical Analysis I (3 Credits)
Approximation theory, numerical solution of initial-value problems, iterative methods for linear systems, optimization.
Prerequisite: CMSC466 or AMSC466; and MATH410. Cross-listed with: CMSC666.
Credit Only Granted for: AMSC666 or CMSC666.

AMSC670 Ordinary Differential Equations I (3 Credits)
Existence and uniqueness, linear systems usually with Floquet theory for periodic systems, linearization and stability, planar systems usually with Poincare-Bendixson theorem.
Prerequisite: MATH405. And MATH410; or students who have taken courses with comparable content may contact the department. Cross-listed with M ATH670.
Credit Only Granted for: AMSC670 or MATH670.

AMSC671 Ordinary Differential Equations II (3 Credits)
The content of this course varies with the interests of the instructor and the class. Stability theory, control, time delay systems, Hamiltonian systems, bifurcation theory, and boundary value problems.
Prerequisite: MATH630. Cross-listed with: MATH671.
Credit Only Granted for: AMSC671 or MATH671.

AMSC673 Partial Differential Equations I (3 Credits)
Analysis of boundary value problems for Laplace's equation, initial value problems for the heat and wave equations. Fundamental solutions, maximum principles, energy methods. First order nonlinear PDE, conservation laws. Characteristics, shock formation, weak solutions. Distributions, Fourier transform.
Prerequisite: MATH411; or students who have taken courses with comparable content may contact the department. Cross-listed with MATH67 3.
Credit Only Granted for: AMSC673 or MATH673.

AMSC674 Partial Differential Equations II (3 Credits)
Boundary value problems for elliptic partial differential equations via operator-theoretic methods. Hilbert spaces of functions. Duality, weak convergence. Sobolev spaces. Spectral theory of compact operators. Eigenfunction expansions.
Prerequisite: MATH673 or AMSC673; or permission of instructor. Also offered as: MATH674.
Credit Only Granted for: AMSC674 or MATH674.

AMSC689 Research Interactions in Applied Mathematics and Scientific Computation (1-3 Credits)
The students participate in a vertically integrated (undergraduate, graduate and/or postdoctoral, faculty) research group. Format varies, but includes regular meetings, readings and presentations of material. See graduate program's online syllabus or contact the graduate program director for more information.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

AMSC698 Advanced Topics in Applied Mathematics (1-4 Credits)
Repeatable to: 99 credits if content differs.

AMSC699 Applied Mathematics Seminar (1-3 Credits)
Seminar to acquaint students with a variety of applications of mathematics and to develop skills in presentation techniques.
Repeatable to: 99 credits if content differs.

AMSC714 Numerical Methods For Stationary PDEs (3 Credits)
Topics include: Maximum principle, finite difference method, upwinding, error analysis; Variational formulation of elliptic problems, inf-sup theory; The finite element method and its implementation; Piecewise polynomial interpolation theory in Sobolev spaces; A priori and a posteriori error analyses, adaptivity; Fast solvers; Variational crimes; Mixed finite element methods.
Prerequisite: One graduate level course in partial differential equations or one graduate level course in numerical analysis or scientific computing; or permission of instructor.
Credit Only Granted for: AMSC 714 or AMSC 614.
Formerly: AMSC614.
Additional Information: This course is a complement to the graduate courses MATH 673 and MATH 674 in PDEs, AMSC 666 in numerical analysis, and AMSC 660 and AMSC 661 in scientific computing.

AMSC715 Numerical Methods for Evolution Partial Differential Equations (3 Credits)
Topics include: Heat and wave equations: maximum principle, energy methods and Sobolev spaces, finite difference and finite element methods, von Neumann analysis, stability and error estimates;Linear first order PDEs: upwinding and monotone schemes, finite difference, finite volume, and discontinuous Galerkin methods; Nonlinear conservation laws: weak solutions and entropy conditions,monotone methods.
Prerequisite: Permission of instructor; or one graduate level course in partial differential equations or one graduate level course in numerical analysis or scientific computing.
Credit Only Granted for: AMSC612 or AMSC715.
Formerly: AMSC612.
Additional Information: This course continues AMSC 714, but can be taken independently, and is a complement to the graduate courses MATH 673 and MATH 674 in PDEs, AMSC 666 in numerical analysis, and AMSC 660 and AMSC 661 in scientific computing.

AMSC760 Applied Statistics Practicum (3 Credits)
A semester long applied applied statistical project (a minimum 10 hours per week or 120 hours in total), in an internship of collaborative research-laboratory setting working on a substantive applied quantitative project with significant statistical content.
Prerequisite: Must have completed one year of graduate study in Applied Statistics.
Restriction: Must have project proposal approved by SAC coordinator.

AMSC761 Applied Statistics Seminar (1 Credit)
Seminar taught once yearly on a rotating basis by faculty engaged in the Applied Statistics area. Required of AMSC Applied Statistics area doctoral students within one year following the completion of their practicum project, AMSC760, and open only to Applied Statistics Area students. The seminar will include sessions on presentation skills, but will consist primarily of oral presentations of students' past Practicum project results. Students attend throughout the term, give one talk (at least 1/2 hour).
Recommended: STAT700 or STAT701; and (STAT740 or STAT741).

AMSC762 Data Analysis Project (1 Credit)
This course cannot be used to meet any of the Applied Statistics Area's seminar requirements. Offered yearly, required of and limited to MS non-thesis and doctoral students in Applied Statistics Area, for whom the resulting projects serve as a Qualifying Exam component. After 5-6 lectures or presentations on components of successful data analyses and write-ups, 3-4 sessions will discuss previous student project submissions. The culminating project, to be completed in a two week period between semesters, is an analysis and written report of one of three project choices made available each year to represent a spectrum of realistic applied statistical problems.
Restriction: Permission of CMNS-Applied Mathematics department; and permission of instructor.

AMSC763 Advanced Linear Numerical Analysis (3 Credits)
Advanced topics in numerical linear algebra, such as dense eigenvalue problems, sparse elimination, iterative methods, and other topics.
Prerequisite: AMSC666 or CMSC666; or permission of instructor. Also offered as: CMSC763.
Credit Only Granted for: AMSC600, AMSC763, CMSC760, or CMSC763.
Formerly: AMSC600 and CMSC760.

AMSC764 Advanced Numerical Optimization (3 Credits)
Modern numerical methods for solving unconstrained and constrained nonlinear optimization problems in finite dimensions. Design of computational algorithms and the analysis of their properties.
Prerequisite: MATH410; or permission of instructor. Cross-listed with C MSC764.
Credit Only Granted for: AMSC607, AMSC764 or CMSC764. F ormerly: AMSC607.

AMSC799 Master's Thesis Research (1-6 Credits)

AMSC808 Advanced Topics in Applied Mathematics (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

AMSC819 Applied Mathematics Seminar (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

AMSC898 Pre-Candidacy Research (1-8 Credits)

AMSC899 Doctoral Dissertation Research (1-8 Credits)

AMST - American Studies

AMST418 Cultural Themes in America (3 Credits)
Examination of structure and development of American culture through themes such as "growing up American," "culture and mental disorders," "race," "ethnicity," "regionalism," "landscape," and "humor."
Repeatable to: 6 credits if content differs.

AMST418N Asian American Public Policy (3 Credits)
Using Asian Pacific Americans as a case study, this course will analyze the development of public policy in America. Each week, topics such as community development, voting rights, and the movement to redress the wartime internment of Japanese Americans will serve as backdrops for discussion. We will explore the policy-making roles of legislators, judges, local and national political leaders, journalists, writers, unions, social movements, and community organizations.Cross-listed with: AAST421.
Credit Only Granted for: AAST421, AAST498M or AMST418N.
Formerly: AAST498M.

AMST428 American Cultural Eras (3 Credits)
Investigation of a decade, period, or generation as a case study in significant social change within an American context. Case studies include "Antebellum America, 1840-1860" and "American culture in the Great Depression."
Repeatable to: 6 credits if content differs.

AMST429 Perspectives on Popular Culture (3 Credits)
Topics in popular culture studies, including the examination of particular genres, themes, and issues.
Repeatable to: 6 credits if content differs.

AMST450 Seminar in American Studies (3 Credits)
Developments in theories and methods of American Studies scholarship, with emphasis upon interaction between the humanities and the social sciences in the process of cultural analysis and evaluation.
Prerequisite: AMST201 and AMST340; and 1 course in AMST.
Restriction: Senior standing; and must be in American Studies program.

AMST498 Special Topics in American Studies (3 Credits)
Topics of special interest.
Repeatable to: 9 credits if content differs.

AMST498J Asian American Politics (3 Credits)
Students will gain a greater understanding of 1)the role of Asian Americans in US politics, 2) the political attitudes and behaviors of Asian Americans and 3)how to conduct research on Asian American politics. Though the class will concentrate on Asian Americans, issues related to Asian American politics will be examined within the larger context of America's multicultural political landscape.Cross-listed with: AAST443.
Credit Only Granted for: AAST498T, AAST443, GVPT368C or AMST 498J.
Formerly: AAST498T.

AMST499 Independent Studies (1-3 Credits)
Provides the student with the opportunity to pursue independent, interdisciplinary research and reading in specific areas of American culture studies.
Restriction: Permission of ARHU-American Studies department; and must be in American Studies program.
Repeatable to: 6 credits if content differs.

AMST601 Introductory Theories and History in American Studies (3 Credits)
Explores the formative literature, theories, research approaches, and history of American Studies.
Restriction: Must not be a Graduate Advanced Special Student.

AMST602 Interdisciplinary Research Methods and Bibliographic Instruction (3 Credits)
Advanced instruction interdisciplinary research strategies, bibliography, and the structure of systems of scholarly communication in the fields and subfields of American Studies.

AMST603 Current Approaches to American Studies (3 Credits)
Builds on AMST601 and explores contemporary literature, theory, and intellectual issues in American Studies.
Restriction: Must be in one of the following programs (American Studies (Master's); American Studies (Doctoral)) . Or permission of ARHU-American Studies department; and permission of instructor.

AMST628 Seminar in American Studies (3 Credits)

AMST629 Seminar in American Studies (3 Credits)

AMST638 Orientation Seminar: Material Aspects of American Civilization (3 Credits)
Class meets at the Smithsonian.

AMST639 Reading Course in Selected Aspects of American Civilization (3 Credits)
Class meets at the Smithsonian.

AMST650 Material Culture Studies Theory (3 Credits)
Readings and analysis of canonical and current scholarly approaches to the study of material culture. Covers a wide range of material culture genres and subfields, and focuses on artifacts and the built environment.

AMST655 Introduction to Museum Scholarship (3 Credits)
Provides students a basic understanding of museums as cultural and intellectual institutions. Topics include the historical development of museums, museums as resources for scholarly study, and the museum exhibition as medium for presentation of scholarship.Cross-listed with HIST610, ANTH655.
Credit Only Granted for: AMST655, ANTH655, or HIST610.

AMST698 Directed Readings in American Studies (3 Credits)
This course is designed to provide students with the opportunity to pursue independent, interdisciplinary research and reading in specific aspects of American culture under the supervision of a faculty member.
Repeatable to: 6 credits if content differs.

AMST798 Non-Thesis Research (1-3 Credits)

AMST799 Master's Thesis Research (1-6 Credits)

AMST851 Interpretation of Cultural Landscapes (3 Credits)
A research seminar that provides students an opportunity to survey the principal approaches to studying a cultural landscape, learn how to apply and adapt a field research method, and produce a primary research report on a cultural landscape of their choice.

AMST856 Museum Research Seminar (3 Credits)
A research seminar focusing on the practice and presentation of cultural and historical scholarship in museums and historical sites. Students will complete an original research project on the challenges and opportunities of public exhibition and interpretation of cultural and historical research.
Prerequisite: AMST655, ANTH655, or HIST610. Cross-listed with ANTH856, HIST810.
Credit Only Granted for: AMST856, ANTH856, or HIST810.

AMST857 Museum Scholarship Practicum (3-6 Credits)
Students devise and carry out a research program using the collections at the Smithsonian Institution or some other cooperating museum, working under joint supervision of a museum professional and a university faculty member.
Prerequisite: AMST856, ANTH856, or HIST810.
Restriction: Permission of Museum Scholarship Program required. Cross-listed with ANTH857, HIST811.
Credit Only Granted for: AMST857, ANTH857, or HIST811.

AMST878 American Studies Pedagogy Mentoring (1-3 Credits)
This course provides graduate teaching assistants with a structured approach to pedagogical content, techniques, and collaborative practices that they learn and then can use throughout their careers. It also commits a core faculty member to teaching pedagogy and makes it possible for the course to become a formal part of one's load.
Restriction: Must be an AMST graduate assistant.
Repeatable to: 12 credits.

AMST898 Pre-Candidacy Research (1-8 Credits)

AMST899 Doctoral Dissertation Research (1-8 Credits)

ANSC - Animal Science

ANSC410 The Gut Microbiome and its Roles in Health and Disease (3 Credits)
A comprehensive perspective of the role of gut microbiome/microflora in nutrition, metabolism, disease prevention and health issues including farm animal health and food value, and human gastrointestinal health and immunity.
Prerequisite: BSCI223, ANSC212, ANSC327, EPIB301, BSCI222, BSCI421, or NFSC430; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ANSC489M or ANSC410.
Formerly: ANSC489M.

ANSC417 Regulatory Issues in Animal Care and Management (3 Credits)
A study of regulatory issues affecting animal care and management in the livestock industry. Guest speakers and classroom discussions will focus on key topics including animal welfare, feed and drug regulations, animal identification, CAFO management, processing and marketing of animal products.
Prerequisite: ANSC220, ANSC232, ANSC242, ANSC250, ANSC255, ANSC260, ANSC262, or ANSC282; or permission of instructor.
Additional Information: Field trips may be required for this course.

ANSC435 Experimental Embryology (3 Credits)
Experimental approaches to mammalian embryology with emphasis on domestic livestock systems as applied to research and production systems. Lab will include hands-on experiments and demos of in vitro embryo production, embryo splitting, cell injection and nuclear transfer.
Prerequisite: ANSC212.
Recommended: Completion of one course in reproductive physiology is recommended.
Credit Only Granted for: ANSC435 or ANSC489M.
Formerly: ANSC489M.

ANSC436 Animal Health Policy and Communication (3 Credits)
Intended for upper level students in Veterinary Medicine or Animal Science as well as other students who are interested in understanding how science and politics interact and influence animal health policy and how veterinarians and animal scientists can effectively communicate science to non-scientists such as legislators and policymakers.
Recommended: Completion of ANSC225 and ANSC340 recommend.
Restriction: Must be in a major within the AGNR-Animal & Avian Sciences department; or permission of AGNR-VA-MD Regional COL Veterinary Med.
Credit Only Granted for: ANSC489A or ANSC436.
Formerly: ANSC489A.

ANSC437 Animal Biotechnology (3 Credits)
Key concepts and current issues in animal biotechnology are covered. Current techniques and applications systems as well as social, ethical, and regulatory issues associated with biotechnology will be discussed.
Prerequisite: ANSC327; or students who have taken courses with comparable content may contact the department.

ANSC440 Zoonotic Diseases and Control (3 Credits)
Global perspective of foodborne diseases common to animals and man, specifically those caused by farm animal-originated human pathogens (zoonoses) and their control. A selection of important zoonoses and food safety issues will be specifically covered with an emphasis on the principles of zoonotic disease transmission and control, risk factors to humans, and surveillance methods.
Prerequisite: BSCI223, ANSC212, ANSC327, BSCI222, BSCI421, or NFSC430; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ANSC440 or ANSC489R.
Formerly: ANSC489R.

ANSC443 Physiology of Lactation (3 Credits)
A comprehensive survey of lactation in laboratory and domestic animals. Other species are discussed where possible. Emphasis will be placed on physiological aspects of milk synthesis and secretion and on the cellular and molecular biology of mammary gland development.
Prerequisite: CHEM231, ANSC212, and CHEM232.
Recommended: BCHM463.

ANSC444 Domestic Animal Endocrinology (3 Credits)
Current developments in endocrinology as it relates to animals used in the production of food and other products important to the well being of humans will be covered.
Prerequisite: ANSC212; or permission of instructor.
Restriction: Must not have completed ANSC644.
Credit Only Granted for: ANSC489I, ANSC444, or ANSC644.
Formerly: ANSC489I.

ANSC446 Physiology of Mammalian Reproduction (3 Credits)
Anatomy and physiology of reproductive processes in domesticated and wild mammals.
Prerequisite: ANSC212 or BSCI440.

ANSC447 Physiology of Mammalian Reproduction Laboratory (1 Credit)
Gross and micro-anatomy, artificial insemination, estrous cycle synchronization and invitro-fertilization procedures and analytical techniques useful in animal management and reproduction.
Prerequisite: Must have completed or be concurrently enrolled in ANSC446.

ANSC450 Animal Breeding Plans (3 Credits)
Design of animal breeding programs for the genetic improvement of livestock and companion animal species. Principles of population and quantitative genetics. Genetic evaluations of animals, selection strategies and crossbreeding systems. Incorporation of statistics and biotechnology into animal breeding plans.
Prerequisite: ANSC101; and 1 course with a minimum grade of C- from (MATH120, MATH130, MATH136, MATH140).
Restriction: Junior standing or higher.

ANSC452 Avian Physiology (3 Credits)
The digestive, excretory, respiratory, circulatory, immune, skeletal muscle, endocrine and nervous systems of avian species will be examined.
Prerequisite: ANSC212.
Restriction: Junior standing or higher.

ANSC453 Animal Welfare and Bioethics (3 Credits)
Ethical concerns related to the use of animals in modern society. Historical and philosophical overview of animal welfare and bioethics. Applied ethical discussions on human/animal interrelationships, physical and genetic manipulation, and other current issues associated with the treatment of animals used in food production, research, zoos, and as pets.
Prerequisite: ANSC101 and ANSC103; or BSCI106; or (BSCI160 and BSCI161); or permission of instructor.
Restriction: Junior standing or higher.

ANSC454 Nutritional Aspects of Metabolic Disease (3 Credits)
Biochemical and physiological fundamentals of nutrition. Discussion of protein, fat,carbohydrate, minerals and vitamins and their roles and interrelationships innutrition, metabolism and diseases in humans and animals. The course will use recommended texts for foundation material as well as research papers to provide in-depth coverage and illustrate emerging themes in metabolic aspects of nutrition and disease.
Prerequisite: CHEM131 and ANSC101, or BSCI170; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ANSC4890 or ANSC454.
Formerly: ANSC489O.

ANSC455 Applied Animal Behavior (3 Credits)
Principles of animal behavior applied to production systems in animal agriculture.
Prerequisite: ANSC101 and ANSC103; or BSCI106; or (BSCI160 and BSCI161).

ANSC460 Comparative Vertebrate Immunology (3 Credits)
Basic concepts in immunology, and comparing immunity in different vertebrates, including organization of immune systems, innate and adaptive immune responses. Special attention will be paid to how cell-mediated and humoral immune responses are induced in natural infections, and what are the effector mechanisms in both of these processes. Immune response in representative disease models such as infections with viruses and bacteria, cancer, and autoimmune disease will be discussed. Lectures concerning cutting-edge research will also be given.
Prerequisite: ANSC212, BSCI201, or BSCI440.
Credit Only Granted for: ANSC460 or ANSC489I.
Formerly: ANSC489I.

ANSC489 Current Topics in Animal Science (1-3 Credits)
Examination of current developments in the animal sciences.
Repeatable to: 6 credits if content differs.

ANSC497 Animal Biotechnology Recombinant DNA Laboratory (3 Credits)
An advanced course offering hands-on experience in performing recombinant DNA experiments. Current molecular biology techniques used for cloning genes, analyzing the gene products, and modifying the genes of animals will be performed. Techniques include isolation of DNA, use of restriction enzymes; cloning procedures, PCR analysis, and Southern hybridizations. Lecture material focuses on interpretation of results generated in the laboratory.
Prerequisite: ANSC327; or students who have taken courses with comparable content may contact the department.
Recommended: ANSC437 and ANSC435.

ANSC617 Quantative Techniques in Physiology and Nutrition (3 Credits)
Development and evaluation of quantative techniques to explore mechanisims of physiological and nutritional regulation. Kinetic and dynamic models will be emphasized.
Prerequisite: MATH120; or permission of AGNR-Animal & Avian Sciences department.

ANSC624 Recent Advances in Animal and Avian Sciences (1 Credit)
Seminar course in advanced animal science research.
Restriction: Must be an Animal Sciences graduate student.
Credit Only Granted for: ANSC698C or ANSC624.
Formerly: ANSC698C.

ANSC625 Developing Presentation Skills (1 Credit)
Seminar designed to teach oral presentation skills for animal science students.
Restriction: Must be an Animal Sciences graduate student.
Credit Only Granted for: ANSC625 or ANSC698D.
Formerly: ANSC698D.

ANSC627 Molecular and Quantitative Genetics (3 Credits)
Classical, molecular, and population genetics with specific emphasis on animal systems will be covered. Also, disseminate information on molecular approaches for manipulating genetics at the whole animal level (transgenic and cloning). Other model organisms will be discussed to provide a conceptual framework.

ANSC644 Molecular and Cellular Endocrinology (3 Credits)
A comprehensive course covering the major endocrine systems in animals. Lecture topics include major endocrine axes, hormonal regulation of homeostasis, growth and reproduction, and endocrine mechanisms of action. Advanced concepts in the molecular and cell biology of hormone action and regulation addressed in weekly discussion sessions centered on current research publications in the field of molecular and cellular endocrinology.
Restriction: Must not have completed ANSC444.
Credit Only Granted for: ANSC444,ANSC489I, ANSC644, or ANSC688I.
Formerly: ANSC688I.

ANSC660 Poultry Literature (1-4 Credits)
Readings on individual topics are assigned. Written reports required. Methods of analysis and presentation of scientific material are discussed.

ANSC688 Special Topics (1-4 Credits)
Lectures, experimental courses, and other special subjects in the fields of animal sciences and veterinary medicine.
Repeatable to: 4 credits.

ANSC698 Seminar (1 Credit)
Students are required to prepare papers based upon current scientific publications relating to animal science, or upon their research work, for presentation before and discussion by the class; (1) recent advances; (2) nutrition; (3) physiology; (4) biochemistry.

ANSC699 Special Problems in Animal Science (1-2 Credits)
Work assigned in proportion to amount of credit. Prerequisite: approval of staff. Problems will be assigned which relate specifically to the character of work the student is pursuing.

ANSC799 Master's Thesis Research (1-6 Credits)

ANSC898 Pre-Candidacy Research (1-8 Credits)

ANSC899 Doctoral Dissertation Research (1-8 Credits)

ANTH - Anthropology

ANTH411 Anthropology of Immigration and Health (3 Credits)
The United Nations estimates that some 230 million people around the world are migrants who live outside their country of birth. This course focuses on these migrant populations, considering the implications of movement across borders and settlement in new societies on their health and well-being. We will investigate the social, political, and economic structures that shape disease and illness and produce differential access to health care for migrants. Within that context, we will explore the health effects of migration itself and particular health conditions from which migrants suffer. We will also examine how migrants interface with differently configured health care systems as well as strategies they and their advocates use to promote health and well-being.Jointly offered with ANTH611.
Credit Only Granted for: ANTH411 or ANTH611.

ANTH412 Hypermarginality and Urban Health (3 Credits)
Using perspectives from medical and urban anthropology, we examine the phenomenon of hypermarginality--the clustering of extreme poverty, chronic disease, addiction, violence and trauma in certain social and spatial contexts, often urban. We will explore both the broader social, political, and economic structures of exclusion that produce hypermarginality, as well as the illness experiences associated with these conditions. As we consider both social suffering and the related institutional responses, we will also discuss the role of anthropological approaches in national discussions about health inequities.
Credit Only Granted for: ANTH412 or ANTH612.

ANTH413 Health Disparities in the United States (3 Credits)
Powerful economic, political, social, and cultural forces shape who gets sick, what illnesses/diseases they get, how they are treated while seeking care, what treatment options they have, and what their ultimate health outcomes are. The goal of the course is to understand these processes through the lens of critical medical anthropology
Credit Only Granted for: ANTH468Q, ANTH688Q, ANTH413, or ANTH613.
Formerly: ANTH468Q.

ANTH415 Advanced Studies in Global Health (3 Credits)
Extends understandings of diverse health conditions facing world populations today and the science being made around them. Critically examines key issues in global aid and public health, with an emphasis on the theories, concepts, and methods of anthropology.
Recommended: ANTH210, ANTH310, or ANTH265 or a similar course focused on global health or medical anthropology course. Jointly offered with: ANTH615.
Credit Only Granted for: ANTH415 or ANTH615.

ANTH416 Anthropology of Global Violence (3 Credits)
An examination of anthropological approaches to the study of violence, drawing from key texts to analyze how violence operates along a continuum: from routine, sometimes invisible forms of violence embedded in everyday life, to more overt and exceptional forms. Consideration of the role of ethnography in elucidating both the subjective experiences of violence and the ways in which violence is embedded in institutions, structures, and global political-economic processes. Analysis of the specific relationships between violence, health, mental health, and trauma in local and global contexts.Jointly offered with ANTH616.
Credit Only Granted for: ANTH468O, ANTH66 8O, ANTH416 or ANTH616.
Formerly: ANTH468O.

ANTH421 Nutritional Anthropology (3 Credits)
The study of nutrition from an anthropological perspective which includes both biological and cultural aspects of nutrition. We will explore how nutrition can affect culture how culture can affect nutrition. Nutritional anthropology includes the study of cross-cultural variation in diet, nutritional status and subsistence systems as well as variation in these factors over the evolutionary course of human existence, from prehistoric and historic to modem times. Students will be introduced to nutritional anthropology and provided with the basics for assessing reliability and feasibility of nutritional advice and policy encountered in everyday modern life in a global setting.
Credit Only Granted for: ANTH421, ANTH428N, or ANTH621.
Formerly: ANTH428N.

ANTH422 Human-Plant-(Human & Bioactive Plant) Interaction (3 Credits)
This seminar course will discuss the evolutionary, historical, cultural, and ecological aspects of coevolution with respect to humans and their interactions with specific bioactive plants. Case studies of human- plant-(pathogen) interactions will be discussed as well as an inclusive survey of anthropologically important phytochemicals. The seminar incorporates human-plant-(pathogen) interactions into models of human evolution and ecology.
Prerequisite: ANTH220 and ANTH320; or permission of BSOS-Anthropology department.
Credit Only Granted for: ANTH422.
Formerly: ANTH428I.

ANTH424 Human Skeletal Anatomy (3 Credits)
In addition to descriptive information about bone identification, the lectures will address the history of human anatomical studies, the development of analytical techniques, and the application of these techniques in paleoanthropology, comparative anatomy, functional anatomy (and related fields, such as physical therapy), and skeletal analysis in museum, historic cemetery, archaeological, and forensic settings. Emphasis will be on the development of the skeleton and recognition of normal variation in bones. The laboratory sessions will allow the students access to human bones for the purpose of identification, documentation of human variation, and application of techniques to obtain information about the living individual from the skeleton.

ANTH428 Special Topics in Bioanthropology (3 Credits)
Advanced research courses in biological anthropology on changing topics that correspond to new theoretical interests, faculty research interests, or the specialties of visiting scholars. Prerequisites or background knowledge vary with the topic. Check with the department for requirements.
Repeatable to: 6 credits if content differs.

ANTH429 Advanced Special Topics in Biological Anthropology (3 Credits)
Upper level biological anthropology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Repeatable to: 6 credits if content differs.

ANTH435 Archaeological Ethnography and Heritage Ethnography (3 Credits)
Archaeologists and other heritage experts are increasingly incorporating ethnographic approaches as part of their methodological toolkit. This course explores key methods and frameworks in archaeological ethnography and heritage ethnography, set within the broader contexts of the historical development of anthropological theory and the current rapid growth of heritage studies as an interdisciplinary field of research and practice.Jointly offered with: ANTH635.
Credit Only Granted for: ANTH435 or ANTH635.

ANTH438 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

ANTH440 Theory and Practice of Historical Archaeology (3 Credits)
Historical archaeology enhances cultural heritage by providing voice for groups who were often unable to record their own histories, such as women, laborers, working class families, and enslaved people. The course provides insight into issues related to race, gender, and ethnicity as they relate to multicultural histories.
Prerequisite: ANTH240. Jointly offered with ANTH640. Credit only grant ed for: ANTH440 or ANTH640.

ANTH441 Archaeology of Diaspora (3 Credits)
"Diaspora" is defined, theorized, deconstructed, and employed throughout the social sciences. There are context specific relations that define who leaves, when, and how they are received in the new place of settlement. Over the course of the semester the class will actively and critically examine the relevance of historical archaeology and material culture studies in the understanding of the formation, experiences, and transformation of diasporic groups over time and space.
Prerequisite: ANTH240.
Credit Only Granted for: ANTH448A, ANTH688Z, or ANTH441.
Formerly: ANTH448A.

ANTH442 Public Archeology (3 Credits)
Explores the uses and environments for archaeological work through a discussion of museum, electronic media, heritage settings, outdoor history museums, including the legal environment that offers protection for archaeological remains. The course exposes students to the majority of cultural media within which archaeology is currently practiced. The interdisciplinary course is a survey of the progress made within and beyond anthropology in understanding the function of heritage, public memory, tourism, and the other popular uses of materials from the past, including the progress made in linguistics psychology and other cognitive disciplines in understanding the purpose of the past.
Credit Only Granted for: ANTH442, ANTH448V, or ANTH642.
Formerly: ANTH448V.

ANTH444 Theories of the Past (3 Credits)
The primary purpose is to highlight some of the key achievements made by archaeologists in informing questions of interest to society from 1850 on. Key achievements include how archaeologists understand elements of the past thought to be central to the development of modern socieity. A secondary purpose is to introduce students to the theories used to understand the place of the past in society and the function of answers to questions thought central to modern social life.
Prerequisite: ANTH240. Jointly offered with ANTH740. Credit only grant ed for: ANTH448P, ANTH444, or ANTH740.
Formerly: ANTH448P.

ANTH445 Laboratory Methods in Archaeology (3 Credits)
The processing, curation, cataloging and analysis of data is an important part of any archaeology field project. Students will learn that basics of laboratory techniques necessary for the final analysis and interpretation of field data.
Prerequisite: ANTH496.
Recommended: ANTH240.

ANTH447 Material Culture Studies in Archaeology (3 Credits)
An in-depth introduction to the world of material culture studies with a focus on the methods and theories in historical archaeology. Students will look at archaeological data as historical documents, commodities and as symbols expressing ideas.
Prerequisite: ANTH240.
Credit Only Granted for: ANTH447, ANTH448C, ANTH647, or ANTH689C.
Formerly: ANTH448C.

ANTH448 Special Topics in Archaeology (3 Credits)
Advanced topics in archaeological research, corresponding to new theoretical developments, faculty research interests, or specialties of visiting scholars. Prerequisites may vary with course topic; check with the department for requirements.
Prerequisite: ANTH240.
Repeatable to: 6 credits if content differs.

ANTH449 Advanced Special Topics in Archaeology (3 Credits)
Upper level archaeology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Repeatable to: 6 credits if content differs.

ANTH450 Theory and Practice of Environmental Anthropology (3 Credits)
An overview of contemporary application of cultural theory and methods to environmental problems. Topics include the use of theories of culture, cognitive approaches, discourse analysis, and political ecology. Case studies from anthropology, other social sciences, humanities, conservation, and environmental history are used to demonstrate the applied value of a cultural-environmental approach.
Restriction: Junior standing or higher. Jointly offered with ANTH650.
Credit Only Granted for: ANTH450 or ANTH650.

ANTH451 Environmental Archaeology (3 Credits)
An overview of modern environmental archaeology as a tool for the interdisciplinary investigation of past and present global change and to engage the long term past with current issues of sustainability and rapid environmental change.
Credit Only Granted for: ANTH451, ANTH651, ANTH448F, ANTH668F.
Formerly: ANTH448F.

ANTH452 Anthropology and Climate Change (3 Credits)
Human activities now influence ongoing global climatic change, and the outcome remains uncertain for communities and cultures around the world. This interaction between humans and climate provides a rich area of study for anthropologists in an interdisciplinary context. Case studies of historic and contemporary evidence will be used to understand impacts of global climate change and assess opportunities and barriers to successful responses and adaptation.
Prerequisite: ANTH220, ANTH222, ANTH240, or ANTH260.
Credit Only Granted for: ANTH452 or ANTH652.

ANTH453 Archaeology of the Modern City (3 Credits)
An overview of how social scientists, in particular historical archaeologists, approach modern cities as being part of the materiality of the social structure and order.
Prerequisite: ANTH240; or permission of instructor.
Credit Only Granted for: ANTH448Q or ANTH453.
Formerly: ANTH448Q.

ANTH454 Political Ecology (3 Credits)
The use of the environment is contested and negotiated within historic and contemporary societies. Incorporating methods and perspectives from across the social sciences through specific case studies in the Americas, Europe, Asia and Africa, this course offers a survey to coupled human-environmental systems.Jointly offered with: ANTH654.
Credit Only Granted for: ANTH454 or ANTH654.

ANTH456 Conservation and Indigenous People in South America (3 Credits)
Considers indigenous peoples and their relation to the lands on which they live, issues of traditional indigenous knowledge and land management as well as new contributions by indigenous peoples to changing landscapes. Reviews legal mechanisms and instruments through which indigenous peoples have rights to the resources they occupy and utilize. Taking specific cases and examining them through the lens of political and social ecology, the role of indigenous peoples in local and worldwide conservation efforts is considered. Case studies will emphasize the indigenous peoples and conservation policies of Latin America.Jointly offered with: ANTH656.
Credit Only Granted for: ANTH468L, ANTH456, ANTH688L, or ANTH656.
Formerly: ANTH468L.

ANTH461 Language as Practice (3 Credits)
An introduction to linguistic variation and the construction of identity, relationship, and community membership through language use. The approach emphasizes language as community-based practice and examines the dynamic construction of social relations through linguistic interactions.Jointly offered with: ANTH661.
Credit Only Granted for: ANTH461, ANTH468I or ANTH661.
Formerly: ANTH468I.

ANTH462 Amazon Through Film (3 Credits)
An interdisciplinary course that utilizes film to consider the Amazon basin, its history, peoples, and landscapes through cinematic representations. The course places the films in the context of film history and critical theory. The course takes into consideration the Brazilian, North American, Mexican, European and Argentine creators of the films and their visions of Amazonia, as well as the audiences and markets to which the films are intended.
Credit Only Granted for: ANTH468D or ANTH462.
Formerly: ANTH468D.

ANTH464 Anthropology of Cultural Heritage (3 Credits)
A global exploration of how the past is remade in the present. Covers the breadth of scope and specific interventions of heritage practice at the global scale, including the social, political, economic, and ethical dimensions of cultural heritage.
Prerequisite: ANTH260. Jointly offered with ANTH664. Credit only grant ed for: ANTH469T, ANTH689T, ANTH464, ANTH664.
Formerly: ANTH469T.

ANTH466 Anthropology of Work (3 Credits)
Examines the concept and meaning of work, the different types of work, and how the development of time discipline became essential for the creation of capitalist labor. Explores the contemporary social justice movement and its impact on gender and racialized inequities. Includes an exploration of deindustrialized regions in the Rust Belt.Jointly offered with: ANTH666.
Credit Only Granted for: ANTH466 or ANTH666.

ANTH467 Researching Environment and Culture (3 Credits)
In this applied course, students use mixed methods to research a locally-based, environmental sustainability issue. Classroom time will be split between seminar discussions of theory, methods, and relevant case studies, and lab work focused on project development, data analysis, and report write up. Students are expected to spend additional time outside class on data collection, analysis, and writing
Recommended: ANTH322, ANTH360, ENSP101, or ENSP102.

ANTH468 Special Topics in Cultural Anthropology (3 Credits)
Advanced courses in varying specialty areas of cultural anthropology that respond to new theoretical developments, faculty research interests, or specialties of visiting scholars.
Repeatable to: 6 credits if content differs.

ANTH469 Advanced Special Topics in Cultural Anthropology (3 Credits)
Upper level cultural anthropology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Repeatable to: 6 credits if content differs.

ANTH472 Medical Anthropology (3 Credits)
An exploration of the cultural, social, economic and political dimensions of health, disease, and illness. These dimensions will be examined through both the health-seeker's and the care-provider's perspectives.
Credit Only Granted for: ANTH472, ANTH468, ANTH672, or ANTH688L.
Formerly: ANTH468L.

ANTH473 Native American Languages and Cultures (3 Credits)
An introduction to Native American Languages and Cultures from a linguistic anthropological perspective. Topics to be explored include Native American identities, the stucture of Native languages, oral traditions, narrative story-telling, Native language and thought (Sapir/Whorf), language shift, linguistic revitalization, documentation of endangered languages, indigenous representation and appropriation, and racializing discourses.Jointly offered with: ANTH673.
Credit Only Granted for: ANTH473 or ANTH673.

ANTH474 Language Racism & Identity (3 Credits)
An exploration of the relationship between language, identity and racism in a variety of social contexts, in the U.S. and elsewhere.Jointly offered with: ANTH674.
Credit Only Granted for: ANTH474, ANTH469R, ANTH674, or ANTH689R.

ANTH476 Senior Research (3-4 Credits)
Capstone course in which students pursue independent research into a current problem in anthropology, selected with assistance of a committee of faculty. Research leads to the writing of a senior thesis in anthropology.
Restriction: Must be in Anthropology program.
Credit Only Granted for: ANTH476 or ANTH486.

ANTH477 Senior Thesis (3-4 Credits)
Capstone course in which students write a senior thesis on independent research into a current problem in anthropology. The thesis is defined before a committee of faculty.
Prerequisite: ANTH476.
Restriction: Permission of BSOS-Anthropology department; and must be in Anthropology program.
Credit Only Granted for: ANTH477 or ANTH487.

ANTH478 Special Topics in Linguistics (3 Credits)
Advanced courses in specialty areas that respond to new theoretical developments and faculty research interests in linguistics.
Recommended: LING200.
Repeatable to: 6 credits if content differs.

ANTH485 Honors Research Preparation (3 Credits)
Honors Research Preparation is an independent study course during which the Honors candidate will work with their Honors Thesis Advisor to establish not only the structure of the thesis and timeline, but also the formation of Thesis Review Committee.
Restriction: Permission of BSOS-Anthropology department; and must be in Anthropology program; and must be admitted to University Honors Program or Anthropology Honors Program.

ANTH486 Honors Research (3-4 Credits)
Capstone course in which students pursue independent research into a current problem in anthropology, selected with assistance of a committee of faculty. Research leads to the writing of an honors thesis in anthropology.
Restriction: Permission of BSOS-Anthropology department; and must be in Anthropology program; and must be admitted to University Honors Program or Anthropology Honors Program.
Credit Only Granted for: ANTH486 or ANTH476.

ANTH487 Honors Thesis (3-4 Credits)
Capstone course in which students write a thesis on the results of independent research into a current problem in anthropology.
Prerequisite: ANTH486.
Restriction: Permission of BSOS-Anthropology department; and must be in Anthropology program; and must be admitted to University Honors Program or Anthropology Honors Program.
Credit Only Granted for: ANTH487 or ANTH477.

ANTH491 Applied Urban Ethnography (3 Credits)
The focus is on the use of applied ethnographic field methods in community assessment research in urban settings. Also, it will extend beyond most ethnographic training in which the emphasis is on being there, and relying predominantly on the classical ethnographic methods of recursive observations, participant observations, and a variety of approaches to interviewing.
Prerequisite: ANTH260. Jointly offered with ANTH617. Credit only grant ed for: ANTH468B, ANTH491, or ANTH617.
Formerly: ANTH468B.

ANTH496 Field Methods in Archaeology (6 Credits)
Field training in the techniques of archaeological survey and excavation.

ANTH498 Advanced Field Training in Ethnography (1-8 Credits)
Experience in field research utilizing a variety of ethnographic methods of inquiry.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: ANTH498 or ANTH698.

ANTH601 Applied Anthropology (3 Credits)
An overview of the history and current practices of applied anthropology. This includes relationships between applied anthropology and other major subfields of the profession; the interdisciplinary and public context of applied anthropology; and problems of significance, utility, and ethics associated with applied anthropology.

ANTH606 Qualitative Methods in Applied Anthropology (3 Credits)
An introduction to the use of ethnography and qualitative methods in applied and policy contexts. Qualitative methods discussed include informal and systematic approaches. Students undertake fieldwork in local settings to practice the qualitative methods and to develop analysis and report writing skills.

ANTH611 Anthropology of Immigration and Health (3 Credits)
The United Nations estimates that some 230 million people around the world are migrants who live outside their country of birth. This course focuses on these migrant populations, considering the implications of movement across borders and settlement in new societies on their health and well-being. We will investigate the social, political, and economic structures that shape disease and illness and produce differential access to health care for migrants. Within that context, we will explore the health effects of migration itself and particular health conditions from which migrants suffer. We will also examine how migrants interface with differently configured health care systems as well as strategies they and their advocates use to promote health and well-being.
Credit Only Granted for: ANTH411 or ANTH611.

ANTH612 Hypermarginality and Urban Health (3 Credits)
Using perspectives from medical and urban anthropology, we examine the phenomenon of hypermarginality--the clustering of extreme poverty, chronic disease, addiction, violence and trauma in certain social and spatial contexts, often urban. We will explore both the broader social, political, and economic structures of exclusion that produce hypermarginality, as well as the illness experiences associated with these conditions. As we consider both social suffering and the related institutional responses, we will also discuss the role of anthropological approaches in national discussions about health inequities.Jointly offered with ANTH412.
Credit Only Granted for: ANTH412 or ANTH612.

ANTH613 Health Disparities in the United States (3 Credits)
Powerful economic, political, social, and cultural forces shape who gets sick, what illnesses/diseases they get, how they are treated while seeking care, what treatment options they have, and what their ultimate health outcomes are. The goal of the course is to understand these processes through the lens of critical medical anthropologyJointly offered with ANTH413.
Credit Only Granted for: ANTH413, ANTH469 Q, ANTH689Q, or ANTH613.
Formerly: ANTH689Q.

ANTH615 Advanced Studies in Global Health (3 Credits)
Extends understandings of diverse health conditions facing world populations today and the science being made around them. Critically examines key issues in global aid and public health, with an emphasis on the theories, concepts, and methods of anthropology.Jointly offered with: ANTH415.
Credit Only Granted for: ANTH415 or ANTH615.

ANTH616 Anthropology of Global Violence (3 Credits)
An examination of anthropological approaches to the study of violence, drawing from key texts to analyze how violence operates along a continuum: from routine, sometimes invisible forms of violence embedded in everyday life, to more overt and exceptional forms. Consideration of the role of ethnography in elucidating both the subjective experiences of violence and the ways in which violence is embedded in institutions, structures, and global political-economic processes. Analysis of the specific relationships between violence, health, mental health, and trauma in local and global contexts.
Credit Only Granted for: ANTH416 or ANTH616.

ANTH620 Environment and Society (3 Credits)
Students will obtain foundational knowledge of core theories and methods that integrate cultural and socio-economic research into environmental science. Key topics include: coupled natural and human systems, cultural models of the environment, social networks, ecological economics, political ecology, environmental justice, and science communication.Cross-listed with: MEES620.
Credit Only Granted for: ANTH620 or MEES620.
Additional Information: Offered over the interactive video network.

ANTH629 Advanced Developments in Biological Anthropology (3 Credits)
Graduate biological anthropology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Restriction: Permission of BSOS-Anthropology department.
Credit Only Granted for: ANTH429 or ANTH629.

ANTH630 Quantification and Statistics in Applied Anthropology (3 Credits)
An intensive overview of key quantitative and statistical approaches used by social scientists in applied ad policy research. This includes nonparametric and parametric statistical approaches. Students utilize statistical software and analyze existing and student-created databases. Anthropological case studies are emphasized.
Restriction: Must be in one of the following programs (Anthropology (Doctoral); Anthropology (Master's)).

ANTH633 Archaeology of Slavery: Classical, Caribbean and North American Contexts (3 Credits)
Has slavery always existed? Does it come and go? North American plantation archaeology has become one of the foundations for understanding African American culture from the 1960s. Slavery in Antiquity existed in Greece and Rome on large scales and was essential to making commercial agriculture profitable work. Slavery in the Caribbean showed Europeans how to make a profit from African bodies. Trafficking in human persons today is recorded by the U.S. State Department annually and is regarded as modern slavery. These varying contexts of slavery will be compared in an attempt to understand slavery scientifically.Jointly offered with: ANTH433.
Credit Only Granted for: ANTH433 or ANTH633.

ANTH635 Archaeological Ethnography and Heritage Ethnography (3 Credits)
Archaeologists and other heritage experts are increasingly incorporating ethnographic approaches as part of their methodological toolkit. This course explores key methods and frameworks in archaeological ethnography and heritage ethnography, set within the broader contexts of the historical development of anthropological theory and the current rapid growth of heritage studies as an interdisciplinary field of research and practice.Jointly offered with: ANTH435.
Credit Only Granted for: ANTH435 or ANTH635.

ANTH640 Advanced Studies in Theory and Practice of Historical Archaeology (3 Credits)
Historical archaeology enhances cultural heritage by providing voice for groups who were often unable to record their own histories, such as women, laborers, working class families, and enslaved people. The course provides insight into issues related to race, gender, and ethnicity as they relate to multicultural histories.Jointly offered with ANTH440.
Credit Only Granted for: ANTH440 or ANTH6 40.

ANTH641 Introduction to Zooarchaeology (3 Credits)
Zooarchaeology is the study of animal remains, especially bones, from archaeological contexts. This course will address both methodology as well as many of the main issues in contemporary zooarchaeology. Zooarchaeology stands at the intersection of a number of social and biological sciences, such as Biology, Osteology, Ecology, History, Anthropology and Economics. We will discuss basic animal osteology and the concepts and practices behind the identification of animal remains from archaeological contexts. We will cover the nature of the data in zooarchaeology, especially issues around using proxy data.Jointly offered with ANTH341.
Credit Only Granted for: ANTH298D, ANTH34 1 or ANTH641.

ANTH643 Anthropological Approaches to Geographic Information Science (3 Credits)
A practical introduction to GIS program use, including the production of archaeological and other maps, profiles, and integrated presentations of plans, photographs, texts, an other digitally available materials, as well as research applications in applied biological and cultural anthropology.
Credit Only Granted for: ANTH448S, ANTH643, or ANTH689S.

ANTH647 Advanced Material Culture Studies in Archaeology (3 Credits)
An in-depth introduction to the world of material culture studies with a focus on the methods and theories in historical archaeology. Students will look at archaeological data as historical documents, commodities and as symbols expressing ideas.
Credit Only Granted for: ANTH447, ANTH448C, ANTH647, or ANTH689C.
Formerly: ANTH689C.

ANTH649 Advanced Developments in Archaeology (3 Credits)
Graduate Archaeology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Restriction: Permission of BSOS-Anthropology department.
Repeatable to: 6 credits if content differs.

ANTH650 Advanced Studies in Theory and Practice of Environmental Anthropology (3 Credits)
An overview of contemporary application of cultural theory and methods to environmental problems. Topics include the use of theories of culture, cognitive approaches, discourse analysis, and political ecology. Case studies from anthropology, other social sciences, humanities, conservation, and environmental history are used to demonstrate the applied value of a cultural-environmental approach.Jointly offered with ANTH450.
Credit Only Granted for: ANTH450 or ANTH6 50.

ANTH651 Environmental Archaeology (3 Credits)
An overview of modern environmental archaeology as a tool for the interdisciplinary investigation of past and present global change and to engage the long term past with current issues of sustainability and rapid environmental change.
Credit Only Granted for: ANTH448F, ANTH451, ANTH688F, or ANTH651.
Formerly: ANTH688F.

ANTH652 Anthropology and Climate Change (3 Credits)
Human activities now influence ongoing global climatic change, and the outcome remains uncertain for communities and cultures around the world. This interaction between humans and climate provides a rich area of study for anthropologists in an interdisciplinary context. Case studies of historic and contemporary evidence will be used to understand impacts of global climate change and assess opportunities and barriers to successful responses and adaptation.Jointly offered with ANTH452.
Credit Only Granted for: ANTH452 or ANTH6 52.

ANTH654 Political Ecology (3 Credits)
The use of the environment is contested and negotiated within historic and contemporary societies. Incorporating methods and perspectives from across the social sciences through specific case studies in the Americas, Europe, Asia and Africa, this course offers a survey to coupled human-environmental systems.Jointly offered with: ANTH454.
Credit Only Granted for: ANTH454 or ANTH654.

ANTH655 Introduction to Museum Scholarship (3 Credits)
Provides students a basic understanding of museums as cultural and intellectual institutions. Topics include the historical development of museums, museums as resources for scholarly study, and the museum exhibition as medium for presentation of scholarship.Cross-listed with AMST655, HIST610.
Credit Only Granted for: ANTH655, AMST655, or HIST610.

ANTH661 Language as Practice (3 Credits)
An introduction to linguistic variation and the construction of identity, relationship, and community membership through language use. The approach emphasizes language as community-based practice and examines the dynamic construction of social relations through linguistic interactions.Jointly offered with: ANTH461.
Credit Only Granted for: ANTH468I, ANTH461, or ANTH661.

ANTH664 Anthropology of Cultural Heritage (3 Credits)
A global exploration of how the past is remade in the present. Covers the breadth of scope and specific interventions of heritage practice at the global scale, including the social, political, economic, and ethical dimensions of cultural heritage.
Credit Only Granted for: ANTH469T, ANTH689T, ANTH464 or ANTH664.
Formerly: ANTH689T.

ANTH665 Method & Theory in Medical Anthropology and Global Health (3 Credits)
Provides a critical perspective to global health that encompasses key political, economic, and cultural factors associated with the nature and magnitude of global health issues such as HIV/AIDS, tuberculosis and malaria, paying particular attention to how poverty and inequalities within and between societies has accelerated current global health challenges. Introduces students to how medical anthropologists have contributed to the debates surrounding the globalization of health.
Credit Only Granted for: ANTH310, ANTH465 or ANTH665.

ANTH666 Anthropology of Work (3 Credits)
Examines the concept and meaning of work, the different types of work, and how the development of time discipline became essential for the creation of capitalist labor. Explores the contemporary social justice movement and its impact on gender and racialized inequities. Includes an exploration of deindustrialized regions in the Rust Belt.Jointly offered with: ANTH466.
Credit Only Granted for: ANTH466 or ANTH666.

ANTH669 Advanced Developments in Cultural Anthropology (3 Credits)
Graduate cultural anthropology courses on varying topics derived from new interests of the faculty or the specialties of visiting scholars.
Restriction: Permission of BSOS-Anthropology department.
Repeatable to: 6 credits if content differs.

ANTH672 Advanced Studies in Medical Anthropology (3 Credits)
An exploration of the cultural, social, economic and political dimensions of health, disease, and illness. These dimensions will be examined through both the health-seeker's and the care-provider's perspectives.
Credit Only Granted for: ANTH472, ANTH468L, ANTH672, or ANTH688L.
Formerly: ANTH688L.

ANTH673 Native American Languages and Cultures (3 Credits)
An introduction to Native American Languages and Cultures from a linguistic anthropological perspective. Topics to be explored include Native American identities, the stucture of Native languages, oral traditions, narrative story-telling, Native language and thought (Sapir/Whorf), language shift, linguistic revitalization, documentation of endangered languages, indigenous representation and appropriation, and racializing discourses.Jointly offered with: ANTH473.
Credit Only Granted for: ANTH673 or ANTH473.

ANTH674 Language Racism & Identity (3 Credits)
This course explores the relationship between language, identity and racism in a variety of social contexts, in the U.S. and elsewhere.Jointly offered with: ANTH474.
Credit Only Granted for: ANTH474, ANTH469R, ANTH674, or ANTH689R.

ANTH688 Current Developments in Anthropology (3 Credits)
Detailed investigation of a current problem or research technique, the topic to be chosen in accordance with faculty interests and student needs.
Repeatable to: 9 credits if content differs.

ANTH689 Special Problems in Anthropology (1-6 Credits)

ANTH692 Anthropology of the Immigrant Life Course (4 Credits)
Explores social issues affecting local immigrant populations through readings, research and service learning. Theorizing immigration as a social policy issue in the U.S. culture, students learn about the specific contributions that anthropology has made to the understanding of immigration: globalization on the one hand, and the context of daily life in local neighborhoods on the other.Jointly offered with ANTH492.
Credit Only Granted for: ANTH 492, ANTH69 2, ANTH498N, ANTH689N.
Formerly: ANTH689N.

ANTH696 Field Methods in Archaeology (6 Credits)
Field training in the techniques of archaeological survey and excavation.
Formerly: ANTH699.

ANTH698 Advanced Field Training in Ethnology (1-6 Credits)
Experience in field research utilizing a variety of enthnographic methods of inquiry.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: ANTH498 or ANTH698.

ANTH701 Anthropology Internship Preparation (3 Credits)
Preparation for internship includes practicum training in development, presentation and evaluation of position papers, proposals and work plans; literature search and use of secondary data sources in decision making the effect cultural analysis and resource management; ethics and professional development for work in non-academic settings.

ANTH712 Anthropology Internship Analysis (3 Credits)
The preparation and presentation of internship results, and the development of skills in report writing and presentation. Includes the completion of a professional quality report or publishable paper based on the internship experience.
Prerequisite: ANTH789.

ANTH722 Ecological Anthropology (3 Credits)
An overview of important approaches to ecological anthropology. Population, systems, community, political, behavioral and evolutionary ecology will be examined as they have been applied to a range of anthropological questions. Complexity theory (nonlinear dynamics) and topics in game theory will also be addressed. Students will map the field of ecological anthropology and to assess the strengths and weaknesses of contemporary approaches, methods and theories.
Restriction: Must be in one of the following programs (Anthropology (Doctoral); Anthropology (Master's)).
Credit Only Granted for: ANTH720 or ANTH722.

ANTH740 Theories of the Past and Accomplishments of Archaeology (3 Credits)
The primary purpose is to highlight some of the key achievements made by archaeologists in informing questions of interest to society from 1850 on. Key achievements include how archaeologists understand elements of the past thought to be central to the development of modern socieity. A secondary purpose is to introduce students to the theories used to understand the place of the past in society and the function of answers to questions thought central to modern social life.
Credit Only Granted for: ANTH689P or ANTH740.
Formerly: ANTH689P.

ANTH741 Introduction to Cultural and Heritage Resource Management (3 Credits)
An introduction to the field of cultural and heritage resource management. Examines existing international, national, and local frameworks for the protection of cultural heritage. Provides an overview of employment opportunities and ethical responsibilities within the profession.
Restriction: Must be in the Cultural and Heritage Resource Management Master or Post-Baccalaureate Certificate of Professional Studies Programs; or by permission of the Anthropology department.

ANTH742 Advanced Methods in CRM (3 Credits)
An examination of the range of nondestructive technologies used to research and image cultural and heritage resources. Standard archaeological survey methods will be covered and will focus on remote sensing technologies and how an integrated approach to archaeological investigation can reveal vital information for resource planning, interpretation, and outreach.
Restriction: Must be in the Cultural and Heritage Resource Management Program (CHRM); or by permission of the Anthropology department.

ANTH743 Community Engagement and Consultation (3 Credits)
A grounding in cultural communication and sensitivity to community, cultural, and stakeholder needs within and beyond project specific confines. Using the broader context of practicing anthropology in the exploration of communication styles, learning styles, and cultural biases and taboos, students are exposed to underlying concepts concerning inter-cultural communication so that they may develop more collaborative approaches to research. The program also provides background in the development of public outreach programs in the context of cultural and heritage resource management.
Restriction: Must be in the Cultural and Heritage Resource Management Program (CHRM); or by permission of the Anthropology department.

ANTH744 Collections, Data Management and Cultural Materials Preservation (3 Credits)
An overview of the process of collecting cultural materials and samples with the goal of obtaining as much information during analysis as possible followed by content relating to archaeological curation and collections management. Provides information on the preservation of cultural materials from the time they leave the field until they are placed in a certified collections facility.
Restriction: Must be in the Cultural and Heritage Resource Management Program (CHRM); or by permission of the Anthropology department.

ANTH745 International Heritage Management (3 Credits)
An examination of international heritage management practices and global ethical and professional norms in order to contextualize domestic cultural resource management in the US. The survey will also explore the linkages and areas for growth between international and domestic heritage practice.
Restriction: Must be in the Cultural and Heritage Resource Management Program; or by permission of the Anthropology department.

ANTH746 Applied Archaeological Theory (3 Credits)
Does cultural and heritage resources management (CHRM) need theory? Can archeological theory help us understand CHRM conventions and configurations, and does CHRM have its own distinctive contribution to make to archaeological theory? This course explores these questions while surveying the key areas of theory that inform the work that CHRM practitioners do, and also the place of CHRM in cultural discourse.
Restriction: Must be in the Cultural and Heritage Resource Management Program; or by permission of the Anthropology department.

ANTH747 Business of CRM (3 Credits)
An overview of the skills necessary for success in managing a CRM program. Students will learn how CRM organizations market and manage clients, prepare and submit budgets and proposals, and coordinate technical staff to successfully complete projects. Topics will address the range of issues that owners and managers are confronted with in their oversight of projects, including the management of employees, ethics and professional responsibilities, ensuring health and safety, and meeting the many contractual obligations of CRM projects.
Restriction: Must be in the Cultural and Heritage Resource Management Masters Program (MPCH) or certificate (Z121) ; or by permission of the Anthropology department.

ANTH748 Project Management (3 Credits)
This capstone class for the MPS in CHRM provides students with a grounding in the critical thinking processes necessary during each stage of the CRM process. It provides students with insights into the processes used as research questions are translated into data and then into an evaluative report. Students review examples of appropriate and inappropriate technical reports and then analyze the reports to understand the thinking processes necessary for project management to provide the client with the documentation necessary for completing the compliance process.
Restriction: Must be in the Cultural and Heritage Resource Management Master's Program (MPCH) or certificate (Z121) ; or by permission of the Anthropology department.

ANTH749 Cultural and Heritage Resource Management Internship (1-6 Credits)
An internship/practicum that would contribute to students' understanding of the overall process of CHRM. Students who are already working in CRM or a closely related field may use their employment as their practicum if the opportunity is available for them to learn beyond their current job duties.
Restriction: Must be in the Cultural and Heritage Resource Management Program (CHRM).
Repeatable to: 12 credits if content differs.

ANTH751 Project Management (3 Credits)
This capstone class for the MPS in CHRM provides students with a grounding in the critical thinking processes necessary during each stage of the CRM process. It provides students with insights into the processes used as research questions are translated into data and then into an evaluative report. Students review examples of appropriate and inappropriate technical reports and then analyze the reports to understand the thinking processes necessary for project management to provide the client with the documentation necessary for completing the compliance process.
Restriction: Must be in the Cultural and Heritage Resource Management Master's Program (MPCH) or certificate (Z121) ; or by permission of the Anthropology department.

ANTH760 Development of Social/Cultural Theory (3 Credits)
A broad perspective of the history of social cultural theory in anthropology and the critical skills needed for understanding the subdiscipline is provided. An overview of the history of theorizing about society and culture will help outline the past, present, and future of anthropology and its relations with other scientific and humanistic disciplines.

ANTH788 Internship Research (1-3 Credits)
This course augments ANTH 789 and is graded in conjunction with it.
Prerequisite: ANTH701.
Restriction: Permission of BSOS-Anthropology department; and must be in one of the following programs (Anthropology (Master's); Anthropology (Doctoral)).

ANTH789 Internship (3-6 Credits)
Individual instruction course supervised by a department faculty member.
Prerequisite: ANTH701.
Repeatable to: 6 credits if content differs.
Formerly: ANTH705.

ANTH799 Master's Thesis Research (1-6 Credits)

ANTH856 Museum Research Seminar (3 Credits)
A research seminar focusing on the practice and presentation of cultural and historical scholarship in museums and historical sites. Students will complete an original research project on the challenges and opportunities of public exhibition and interpretation of cultural and historical research.
Prerequisite: AMST655, ANTH655, or HIST610. Cross-listed with HIST810, AMST856.
Credit Only Granted for: AMST856, ANTH856, or HIST810.

ANTH857 Museum Scholarship Practicum (3-6 Credits)
Students devise and carry out a research program using the collections at the Smithsonian Institution or some other cooperating museum, working under joint supervision of a museum professional and a university faculty member.
Prerequisite: AMST856, ANTH856, or HIST810.
Restriction: Permission of Museum Scholarship Program required. Cross-listed with HIST811, AMST857.
Credit Only Granted for: AMST857, ANTH857, or HIST811.

ANTH898 Pre-Candidacy Research (1-8 Credits)

ANTH899 Doctoral Dissertation Research (1-6 Credits)

AOSC - Atmospheric and Oceanic Science

AOSC400 Physical Meteorology of the Atmosphere (3 Credits)
The application of basic classical physics, chemistry and mathematics t the study of the atmosphere. Composition of the atmosphere; energy sources and sinks (radiation in the atmosphere; radiative balance and radiative forcing of atmospheric processes); atmospheric thermodynamics; clouds and precipitation physics; atmospheric electricity and optics; mesoscale processes (e.g., orographic mesoscale phenomena and instabilities); air mass boundaries; severe weather, tropical cyclones; storms; global circulation.
Prerequisite: 1 course with a minimum grade of C- from (PHYS171, PHYS161, MATH141); or permission of CMNS-Atmospheric & Oceanic Science department.
Formerly: METO400.

AOSC401 Climate Dynamics and Earth System Science (3 Credits)
Introduction of the earth and global climate systems and their major components: atmosphere, land, ocean, biosphere and cryosphere. Key processes governing the function of the earth's climate: Global energy balance and water cycle, climate dynamics (general circulation of the atmosphere and ocean) and climate physics (aerosol, cloud and rain), as well as climate variability and climate changes. Phenomena resulting from this coupled system including El Nino-Southern Oscillation, monsoons, and the hydrological cycle will be discussed, with a focus on how the Earth System responds to global warming.
Prerequisite: AOSC400 or AOSC200; and MATH141; and (PHYS161 or PHYS171). Or permission of instructor.

AOSC420 Physical Oceanography (3 Credits)
Ocean observations. Water masses, sources of deep, intermediate, and surface water. Mass, heat, and salt transport, and the meridional overturning circulation. Geochemical tracers and cycles, including carbon. Western boundary currents, mixed layers, and processes maintaining the thermocline. Coastal and estuarine processes. Surface waves and tides. the ocean's role in climate.
Prerequisite: MATH141 and PHYS141.
Recommended: AOSC200. Also offered as: GEOL670, AOSC670.
Credit Only Granted for: AOSC420, AOSC670, or GEOL670.

AOSC424 Remote Sensing of the Atmosphere and Ocean (3 Credits)
Many of the properties of the atmosphere, ocean, and land surface are most easily observed from satellite remote sensing. This course will provide students with a hands-on introduction to a variety of passive and active sensing techniques and sensors observing our changing environment. Topics include: orbital dynamics and electromagnetic properties of the atmosphere and surface; atmospheric emission characteristics and scattering; chemical composition and spectroscopy; temperature retrievals; detection and retrieval of aerosol, cloud and rain; ocean surface properties; sea surface temperature and color; active sensing of wind stress, sea level, and internal waves; time-dependent gravity; properties of vegetation and ice.
Prerequisite: 1 course with a minimum grade of C- from (PHYS171, PHYS161, MATH141); or permission of instructor.

AOSC431 Atmospheric Thermodynamics (3 Credits)
Classical thermodynamics applied to both the dry and the moist atmosphere. Composition; phase changes of water; stability concepts; Properties of aerosols and clouds, cloud nucleation and precipitation processes, atmospheric electricity, cloud and precipitation chemistry.
Prerequisite: 1 course with a minimum grade of C- from (PHYS171, PHYS161, MATH141).
Recommended: MATH246.
Credit Only Granted for: AOSC431 or METO431.
Formerly: METO431.

AOSC432 Dynamics of the Atmosphere and Ocean (3 Credits)
Equations of motion and their approximation, scale analysis for the atmosphere and the ocean. Conservation properties. Fluid motion in the atmosphere and oceans. Geostrophic/balanced and ageostrphic/unbalanced motion. Circulation, vorticity, and potential vorticity. Introduction to the boundary layer.
Prerequisite: AOSC431.
Corequisite: MATH246.
Credit Only Granted for: AOSC432, METO432, or AOSC632.
Formerly: METO432.

AOSC434 Air Pollution (3 Credits)
Production, transformation, transport and removal of air pollutants. The problems of photochemical smog, the greenhouse effect, stratospheric ozone, acid rain and visibility. Analytical techniques for gases and particles.
Prerequisite: MATH241; or permission of CMNS-Atmospheric & Oceanic Science department.
Formerly: METO434.

AOSC436 Principles of Biogeochemistry (3 Credits)
An introduction to the basic principles of biogeochemistry including aspects of organic geochemistry, biochemistry, microbiology, global geochemical cycles, the origin of life and paleoenvironmental evolution.
Prerequisite: MATH120 or MATH140; or must have completed MATH220. And (GEOL100 or GEOL120); and GEOL322. And CHEM131 and CHEM132; or (CHEM135 and CHEM136).
Restriction: Non-degree-seeking students require the permission of the instructor. Cross-listed with: GEOL436.
Credit Only Granted for: GEOL436 or AOSC436.

AOSC437 Global Climate Change: Past and Present (3 Credits)
A highlight to the fact that global climate change is part of the Earth's past as well as of its present and future. Changes in climate that have occurred in the geologic past can be viewed as the Earth's natural climate variability. These changes are different from, though could be linked with, historical and present anthropogenically-induced climate change. We will discuss the modern climate system, the factors capable of forcing climate change on various time scales, the geologic proxies of past climate change and what these proxies tell us. Finally, we will compare and contrast past climate change with what is understood (and not understood) about modern climate change.
Prerequisite: MATH115 or MATH140; and (GEOL100 or GEOL120); and (CHEM131 or CHEM135); and (CHEM132 or CHEM136).
Restriction: Non-degree seeking students require permission of the instructor.

AOSC447 Machine Learning in Earth Science (3 Credits)
A comprehensive introductory course designed to prepare undergraduate and graduate students for applying machine learning techniques to solve real-world problems in Earth science. It emphasizes practical solution implementation, providing students with essential hands-on experience using the most popular open-source analytics tools based on Python, a general-purpose programming language. The course works through all steps in machine learning, from problem specification, data analytics to analytical solution, and applies advanced statistical and analytical algorithms to uncover hidden data relationships and transform them into predictive understanding or decision support. The topics covered include: Python programming, SciPy and Scikit-learn utility, data engineering, visualization, classifiers, regression models, canonical correlation analysis, structural equation models, decision trees, random forests, boosting machines, support vector machines, clustering, dimensionality reduction, principal component analysis, and neural networks.
Prerequisite: Must have completed MATH140.

AOSC458 Advanced Topics in Atmospheric and Oceanic Science (1-4 Credits)
Special topics in atmospheric and oceanic science are given intensive study. The topic of concentration varies, from semester to semester and depends on student and faculty interests. Often, specialists from other institutions are invited to the campus on a visiting lectureship basis to conduct the course.
Repeatable to: 12 credits.

AOSC462 Ecohydrology (3 Credits)
Focuses on the study of hydrologically-controlled ecosystems, e.g. systems in which either excess and/or deficit of water and nutrients are determinants of its structure and function. Such systems have complex dynamic characteristics that depend on many interrelated links between climate, soil and vegetation.
Prerequisite: MATH240, MATH241 and MATH246; or permission of instructor. Jointly offered with: AOSC662.
Credit Only Granted for: AOSC462 or AOSC662.

AOSC463 Water and Climate Systems (3 Credits)
Focuses on exploring the relationships between water, climate, land, energy, and the economy (the so called "nexus") through an interwoven understanding of the physical, economic, and institutional relationships and constraints that influence management and decision-making process in water supply, energy generation and food production. The course emphasizes the use of integrated assessment (IA) modeling tools as a way to formalize these relationships and explore their implications. Lectures will be complemented with online discussion sessions and applied modeling exercises to get hands-on knowledge of practical solutions to nexus challenges.
Prerequisite: MATH240, MATH241 and MATH246; or permission of instructor. Jointly offered with: AOSC663.
Credit Only Granted for: AOSC463 or AOSC663.
Additional Information: This course is offered through a joint effort of the Earth System Science Interdisciplinary Center (ESSIC, part of UMDb Sciences) and the Joint Global Change Research Institute (a collaboration between UMD and the US Dept of Energyb Northwest National Laboratory).

AOSC470 Synoptic Meteorology (3 Credits)
Atmospheric properties and observations, meteorological analysis and charts, operational numerical forecasts. Application of quasigeostrophic theory, baroclinic instability, midlatitiude and mesoscale weather systems. Tropical meteorology. Weather forecasting using numerical and statistical models. Prediction of weather phenomena on the global, syoptic, meso, and local scales. Analysis of surface and upper air data; Norwegian cyclone model; introduction to weather forecasting.
Prerequisite: Minimum grade of C- in AOSC431 and AOSC432.
Credit Only Granted for: AOSC470, AOSC600, or METO600.

AOSC472 Mesoscale Meteorology (3 Credits)
Survey a broad range of mesoscale meteorological features with emphasis on convection and associated phenomena. Define the mesoscale and understand its underlying principles; Introduce non-convective circulations and their importance for weather forecasting; Understand the precursors and occurrence of deep moist convection.
Prerequisite: AOSC432, AOSC600, AOSC610, or AOSC470.
Restriction: Non-degree-seeking students require the permission of the instructor. Jointly offered with AOSC602.
Credit Only Granted for: AOSC472 or AOSC6 02.

AOSC475 Carbon Cycle and Climate: Past, Present, and Future (3 Credits)
The fundamentals of the Earth's carbon cycle, a key biogeochemical cycl that controls Earth's climate and life. The changing characteristics of the carbon cycle on several timescales, ranging from geological, interannual, and the more recent anthropogenic influences on carbon cycle and climate. The carbon cycle in the atmosphere, land, ocean, and the biosphere. The underlying human activities such as fossil fuel burning and deforestation that are responsible for the increase in the atmosphere CO2 and our future options in dealing with the carbon problem such as alternative energy and carbon sequestration.Jointly offered with AOSC675.
Credit Only Granted for: AOSC475 or AOSC6 75.

AOSC480 Introduction to Earth System Science (3 Credits)
Focuses on exploring the relationships between the atmosphere, the oceans, water, climate, land, vegetation, energy, and human systems through an interwoven understanding of the physical, biogeochemical and socioeconomic relationships and constraints that influence management and decision-making processes in societal issues such as water supply, power generation, food production, ecosystem services and others. The course introduces integrated assessment (IA) science as a framework to formalize these relationships and explore their implications.
Prerequisite: MATH240, MATH241 and MATH246; or permission of instructor. Jointly offered with: AOSC680.
Credit Only Granted for: AOSC480 or AOSC680.
Additional Information: This course is offered through a joint effort of the Department of Atmospheric and Oceanic Science (AOSC) and the Earth System Science Interdisciplinary Center (ESSIC).

AOSC484 Climate System Modeling (3 Credits)
Fundamentals in building computer models to simulate the components of the climate system: atmosphere, ocean ice, land-surface, terrestrial and marine ecosystems, and the biogeochemical cycles embedded in the physical climate system, in particular, the carbon cycle. Simple to state-of-the-art research models to tackle problems such as the Daisy World, El Nino and global warming.Jointly offered with AOSC684.
Credit Only Granted for: AOSC484 or AOSC6 84.

AOSC493 Senior Research Project I (3 Credits)
Technical writing and oral presentation skills. Planning, writing, and presenting a plan for research in the geosciences.
Prerequisite: Permission of CMNS-Atmospheric & Oceanic Science department.
Restriction: Must be in Atmospheric and Oceanic Science program; or permission of instructor.

AOSC494 Atmospheric and Oceanic Science Seminar (1 Credit)
Exposure to a wide range of contemporary topics in atmospheric, oceanic, and climate sciences, to foster research interests and promote critical thinking through the weekly AOSC departmental seminar series.
Prerequisite: Minimum grade of C- in AOSC431 and AOSC432.

AOSC498 Senior Research Project II (3 Credits)
The project will be based on the research or development plan created in AOSC493. It may be completed with the approval of a faculty advisor in conjunction with an internship. Final written thesis and oral defense will be expected.
Prerequisite: AOSC493.

AOSC499 Special Problems in Atmospheric Science (1-3 Credits)
Research or special study in the field of meteorology and the atmospheric and oceanic sciences.
Prerequisite: Permission of CMNS-Atmospheric & Oceanic Science department.
Repeatable to: 6 credits.
Formerly: METO499.

AOSC600 Synoptic Meteorology I (3 Credits)
Atmospheric properties and observations, meteorological analysis and charts, operational numerical forecasts. Application of quasigeostrophic theory, baroclinic instability, midlatitude and mesoscale weather systems. Tropical meteorology.
Prerequisite: AOSC610.
Credit Only Granted for: AOSC470 or AOSC600.
Formerly: METO600.

AOSC602 Mesoscale Meteorology (3 Credits)
Survey a broad range of mesoscale meteorological features with emphasis on convection and associated phenomena. Define the mesoscale and understand its underlying principles; Introduce non-convective circulations and their importance for weather forecasting; Understand the precursors and occurrence of deep moist convection.

AOSC610 Dynamics of the Atmosphere and Ocean I (3 Credits)
Equations of motion and their approximation, scale analysis for the atmosphere and the ocean. Conservation properties. Fluid motion in the atmosphere and oceans. Circulation and vorticity, geostrophic motion and the gradient wind balance. Turbulence and Ekman Layers.
Prerequisite: Must have completed or be concurrently enrolled in MATH462; or students who have taken courses with comparable content may contact the department.
Formerly: METO610.

AOSC611 Dynamics of the Atmosphere and Oceans II (3 Credits)
Waves and instabilities in the atmosphere and the ocean. Gravity, Rossby, coastal and equatorial waves. Flow over topography. Dynamic instabilities including barotropic, baroclinic, inertial, and instabilities of the coupled ocean-atmosphere system. Stationary waves and multiple equilibria.
Formerly: METO611.

AOSC614 Atmospheric Modeling, Data Assimilation and Predictability (3 Credits)
Solid foundation for atmospheric and oceanic modeling and numerical weather prediction: numerical methods for partial differential equations, an introduction to physical parameterizations, modern data assimilation, and predictability.
Prerequisite: AOSC610; or permission of instructor.

AOSC615 Advanced Methods in Data Assimilation for the Earth Sciences (3 Credits)
An overview of the most important methods of data assimilation. Theory, techniques and strategies of these methods, as well as their possible drawbacks. Hands-on experimentation with variational and other data assimilation systems.
Prerequisite: AOSC614; or permission of instructor.

AOSC617 Atmospheric and Oceanic Climate (3 Credits)
The general circulation of the atmosphere and oceans, historical perspective, observations, and conceptual models; wind-driven and thermohaline circulation of the oceans. Seasonal cycle and monsoon circulations; interannual to interdecadal climate variability; climate change.
Prerequisite: AOSC610; or permission of instructor.
Formerly: METO617.

AOSC620 Physics and Chemistry of the Atmosphere I (3 Credits)
Air parcel thermodynamics and stability; constituent thermodynamics and chemical kinetics. Cloud and aerosol physics and precipitation processes.
Prerequisite: MATH461; or students who have taken courses with comparable content may contact the department.
Formerly: METO620.

AOSC621 Physics and Chemistry of the Atmosphere II (3 Credits)
Spectroscopy; basic concepts in radiative transfer and atmospheric chemistry; photolysis rates for atmospheric molecules.
Prerequisite: MATH462; or students who have taken courses with comparable content may contact the department.
Formerly: METO621.

AOSC624 Remote Sensing of Surface Climate (3 Credits)
The theory and principles of remote sensing as applicable to earth observing satellites. Discussed will be current methods to interpret satellite observations into useful climate parameters. Emphasis will be placed on parameters that provide information about the climate close to the earth surface, and that can be inferred on regional to global scales. Examples are: surface temperature and reflectivity, radiation budgets, soil moisture, and vegetation cover.
Prerequisite: MATH240 and MATH241.

AOSC625 Remote Inference of Atmospheric Properties by Satellite (3 Credits)
Fundamentals of radiative transfer concepts, theories and models pertinent to remote sensing. Satellite platforms, sensors and systems used for operation and research in atmospheric remote sensing. Concepts and technologies of passive and active remote sensing. Remote sensing methods and products of atmospheric constituents, aerosol, cloud, precipitation, temperature and water vapor profiles, precipitation in liquid and ice forms, radiation budget, and remote sensing application in data assimilation for numerical weather forecast (NWP); use of atmospheric remote sensing products for development of global climate model (GCM).

AOSC630 Statistical Methods in Meteorology and Oceanography (3 Credits)
Parametric and non-parametric tests; time series analysis and filtering; wavelets. Multiple regression and screening; neural networks. Empirical orthogonal functions and teleconnections. Statistical weather and climate prediction, including MOS, constructed analogs. Ensemble forecasting and verification.
Prerequisite: STAT400; or students who have taken courses with comparable content may contact the department.
Formerly: METO630.

AOSC632 Atmsopheric Dynamics (3 Credits)
The equations of motion of the atmosphere are developed, and then analyzed with a focus on developing students' intuition about the behavior of the large-scale atmospheric flow in the mid-latitudes. Topics covered: Kinematics; forces in the atmosphere; apparent forces arising from the rotation of the earth; vertical coordinate systems; spherical coordinate; natural coordinates; hydrostatic, cyclostrophic; geostrophic and gradient wind balances; diagnosis of vertical motion (the omega equation); prediction of surface pressure; dynamics of fronts; lifecycle of baroclinic distrubances; introduction to climate sensitivity and climate feedbacks.
Prerequisite: AOSC431.
Corequisite: MATH246.
Restriction: Must not have completed AOSC432.
Credit Only Granted for: AOSC432 or AOSC632.

AOSC633 Atmospheric Chemistry and Climate (3 Credits)
The effects of human activity on atmospheric composition, focused on global warming, the carbon cycle, air pollution, and the ozone layer. Fundamentals of atmosphereic chemistry (spectroscopy, kinetics, isotopic analysis, and biogeochemical cycles) are related to the modern understanding of climate change, air quality, and ozone depletion, based on resources such as satellite missions, field campaigns, and scientific assessments published by international agencies. We also examine how society's energy needs could be met, in the future, in a manner with less impact on atmospheric composition than the present heavy reliance on combusion of fossil fuels.
Prerequisite: CHEM131, CHEM135, or CHEM146. And MATH241; or permission of CMNS-Atmospheric & Oceanic Science department; or permission of CMNS-Chemistry & Biochemistry department. Cross-listed with CHEM633.
Credit Only Granted for: AOSC433, AOSC633, CHEM433, or CHEM633.

AOSC634 Air Sampling and Analysis (3 Credits)
Theory and application of analytical techniques for the analysis of atmospheric gases and particles including priority pollutants. Combined chemical and meteorological considerations in designing field experiments.
Formerly: METO634.

AOSC647 Machine Learning in Earth Science (3 Credits)
A comprehensive introductory course designed to prepare undergraduate and graduate students for applying machine learning techniques to solve real-world problems in Earth science. It emphasizes practical solution implementation, providing students with essential hands-on experience using the most popular open-source analytics tools based on Python, a general-purpose programming language. The course works through all steps in machine learning, from problem specification, data analytics to analytical solution, and applies advanced statistical and analytical algorithms to uncover hidden data relationships and transform them into predictive understanding or decision support. The topics covered include: Python programming, SciPy and Scikit-learn utility, data engineering, visualization, classifiers, regression models, canonical correlation analysis, structural equation models, decision trees, random forests, boosting machines, support vector machines, clustering, dimensionality reduction, principal component analysis, and neural networks.
Prerequisite: MATH140. Jointly offered with: AOSC447.
Credit Only Granted for: AOSC447 or AOSC647.

AOSC652 Analysis Methods in Atmospheric and Oceanic Science (3 Credits)
A variety of the analysis methods used by atmospheric and oceanic scientists will be applied to observational data sets such as Vostok ice core record, temperature trends, and satellite measurements of ozone,sea ice, etc. in a hands-on, computer laboratory setting. Students will be exposed to Fortran and Python as well as modern file formats such as HDF and netCDF. No prior programming experience required.
Prerequisite: PHYS141 and MATH241; or students who have taken courses with comparable content may contact the department.
Recommended: AMSC460, CMSC660, AMSC660, or CMSC460.

AOSC658 Special Topics in Meteorology (1-3 Credits)
Various special topics in meteorology are given intensive study. The topic of concentration varies, from semester to semester and depends on student and faculty interests. Often, specialists from other institutions are invited to the campus on a visiting lectureship basis to conduct the course.
Restriction: Permission of instructor.
Formerly: METO658.

AOSC661 Sustainability Modeling (3 Credits)
Suitable for students who are concerned with sustainability issues, have little or no background in computational modeling, but would like to understand what modeling can do to help solve sustainability problems. By exploring a variety of contemporary societal issues (e.g., water scarcity, biodiversity loss, energy dependence), you will be introduced to modeling approaches for simulating and quantitatively understanding sustainability variables (inputs and outputs), and using modeling towards the design of policy measures that can be implemented as a response to such issues.

AOSC662 Ecohydrology (3 Credits)
The vulnerability and resilience of ecosystems are dependent on phenomena that link the cycling of water, nutrients and other biogeochemically active elements. Understanding the perturbations in these cycles that trigger impacts on ecosystem spatiotemporal characteristics is a challenge that generally transcends disciplinary and geographical boundaries, and is key to sustaining the diversity of life on Earth. This course on ecohydrology focuses on the study of hydrologically-controlled ecosystems, e.g. systems in which either excess and/or deficit of water and nutrients are determinants of its structure and function. Such systems have complex dynamic characteristics that depend on many interrelated links between climate, soil and vegetation.
Prerequisite: AOSC610; and undergraduate level hydrology and/or hydrogeology, familiarity with differential calculus and equations. Please consult with instructor for details.

AOSC663 Water and Climate Systems (3 Credits)
Focuses on exploring options for adaptation and building resilience to the possible impacts of climate change through an interwoven understanding of the physical, biological, social, cultural, economic and institutional constraints of water resources issues and consideration of climate-related risks in the management and decision-making process.
Prerequisite: AOSC610; and undergraduate level hydrology and/or hydrogeology, familiarity with differential calculus and equations. Please consult with instructor for details.

AOSC670 Physical Oceanography (3 Credits)
Ocean observations. Water masses, sources of deep water. Mass, heat, and salt transport, geochemical tracers. Western boundary currents, maintenance of the thermocline. Coastal and estuarine processes. Surface waves and tides. Ocean climate.
Prerequisite: Permission of CMNS-Atmospheric & Oceanic Science department; or permission of CMNS-Geology department. Jointly offered w ith AOSC420, GEOL670.
Credit Only Granted for: GEOL670, AOSC670 or AOSC420.

AOSC675 Carbon Cycle and Climate: Past, Present, and Future (3 Credits)
The fundamentals of the Earth's carbon cycle, a key biogeochemical cycle that controls Earth's climate and life. The changing characteristics of the carbon cycle on several timescales, ranging from geological, interannual, and the more recent anthropogenic influences on carbon cycle and climate. The carbon cycle in the atmosphere, land, ocean, and the biosphere. The underlying human activities such as fossil fuel burning and deforestation that are responsible for the increase in the atmosphere CO2 and our future options in dealing with the carbon problem such as alternative energy and carbon sequestration.Jointly offered with AOSC475.
Credit Only Granted for: AOSC475 or AOSC6 75.

AOSC680 Introduction to Earth System Science (3 Credits)
An introduction to the study of the earth as a system: atmosphere, oceans, land, cryosphere, solid earth, and humans. Cycling of materials and energy in the earth system: the energy cycle, the hydrologic cycle, the carbon cycle, the nitrogen cycle. Climate processes and variability: land-atmosphere, ocean-atmosphere, biosphere-climate, and human interactions, short- and long-term variability in climate.

AOSC684 Climate System Modeling (3 Credits)
Fundamentals in building computer models to simulate the components of the climate system: atmosphere, ocean ice, land-surface, terrestrial and marine ecosystems, and the biogeochemical cycles embedded in the physical climate system, in particular, the carbon cycle. Simple to state-of-the-art research models to tackle problems such as the Daisy World, El Nino and global warming.Jointly offered with AOSC484.
Credit Only Granted for: AOSC484 or AOSC6 84.

AOSC798 Directed Graduate Research (1-3 Credits)
Formerly: METO798.

AOSC818 Frontiers in Atmosphere, Ocean, Climate, and Synoptic Meteorology Research (1 Credit)
A broad range of topics in the contemporary sciences of atmosphere, ocean, climate and synoptic meteorology are covered.
Repeatable to: 18 credits if content differs.

AOSC898 Pre-Candidacy Research (1-8 Credits)

AOSC899 Doctoral Dissertation Research (1-8 Credits)

ARAB - Arabic

ARAB401 Readings in Arabic Literature (3 Credits)
A survey of Modern Arabic literature is given through a range of selected texts. Texts are studied as literature with constant reference to the social, cultural and political contexts in which they were written. Taught in Arabic.
Prerequisite: ARAB305; or permission of ARHU-School of Languages, Literatures, and Cultures department.
Restriction: Must not be a fluent/native speaker of Arabic.

ARAB410 Ideology of Stereotyping: American and Middle Eastern Film and Television (3 Credits)
Exploration of cultural stereotyping, using examples from American and Middle Eastern cinema and television. Students will examine ideological constructs of Otherness and its history, including Orientalism; propaganda techniques; and audiovisual aspects of stereotyping. While the focus is on American and Middle Eastern cultural production, the course will engage broader issues of stereotyping in contemporary society and media. Readings include theories of propaganda and cultural ideology.
Credit Only Granted for: ARAB410, ARAB499Q, FILM429Q.
Formerly: ARAB499Q.

ARAB489 Special Topics in Arabic Studies (3 Credits)
In-depth study of particular aspect of Arabic language and culture. Specific topics to be announced when course is offered. Taught in Arabic.
Prerequisite: ARAB305; or permission of ARHU-School of Languages, Literatures, and Cultures department.

ARAB499 Special Topics in Arabic Studies (3 Credits)
In-depth study of particular aspect of Arabic culture, literature and language. Specific topic to be announced when course is offered.
Repeatable to: 6 credits if content differs.

ARAB628 Special Topics in Arabic Studies (3 Credits)
In-depth study of a particular aspect of Arabic Studies. Topics to be announced when course if offered. Taught in Arabic.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

ARAB638 Special Topics in Middle Eastern Studies (3 Credits)
In-depth study of a particular aspect of Middle Eastern Studies. Topic to be announced when course is offered. Taught in Arabic.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

ARAB788 Internship in Arabic (3-6 Credits)
Field and/or professional experience in a public or private institution where Arabic is the language of work.
Restriction: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

ARAB789 Independent Study in Arabic (1-3 Credits)
Independent study in Arabic. Taught in Arabic.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 9 credits if content differs.

ARCH - Architecture

ARCH400 Architecture Design Studio I (6 Credits)
Introduction to architectural design with particular emphasis on conventions and principles of architecture, visual and verbal communication skills, formal analysis, design process, spatial composition, architectural promenade, basic program distribution, and elementary constructional and environmental responses.
Restriction: Must be in a major in ARCH-Architecture Program; and permission of ARCH-Architecture Program.

ARCH401 Architecture Design Studio II (6 Credits)
Continuation of ARCH 400 with introduction to building typology, urban and contextual issues, design of the vertical surface, and architectural interiors.
Prerequisite: Minimum grade of C- in ARCH400.
Restriction: Must be in Architecture (B.S.) program.

ARCH402 Architecture Design Studio III (6 Credits)
Architectural design studio with emphasis on building and facade typologies, the development of architectural promenade and sequence, public and/or civic infill buildings dependent upon the architectural promenade, and urban housing types of varying densities. The architect's obligations to urban context are explored in many dimensions including historical, typological, and physical.
Prerequisite: Minimum grade of C- in ARCH401.
Restriction: Must be in Architecture (B.S.) program.

ARCH403 Architecture Design Studio IV (6 Credits)
Investigations into the relationship between the man-made and the natural world including introductory issues of assembly and material value. Design of the site and the building are combined into an integral process delimiting and probing the boundaries of each and exploring their reciprocal relationship. The architect's obligations to the natural and urban contexts are explored in many dimensions including historical, typological, environmental, and physical.
Prerequisite: Minimum grade of C- in ARCH402.
Restriction: Must be in Architecture (B.S.) program.

ARCH404 Graduate Architecture Design Studio I (6 Credits)
Introduction to architectural design with particular emphasis on conventions and principles of architecture , visual and verbal communication skills, formal analysis, design process, spatial composition, architectural promenade, basic program distribution, and elementary constructional and environmental responses. Offered fall only.
Recommended: For 3 1/2 year graduate students only.
Restriction: Must be in Architecture (Master's) program.

ARCH405 Graduate Architecture Design Studio II (6 Credits)
Architectural design studio with emphasis on building and facade typologies, the development of architectural promenade and sequence, public and/or civic infill buildings dependent upon the architectural promenade, and urban housing types of varying densities. The architect's obligations to urban context are explored in many dimensions including historical, typological, and physical. Offered spring only.
Prerequisite: Minimum grade of C- in ARCH404.
Restriction: Must be in Architecture (Master's) program.

ARCH406 Graduate Architecture Design Studio III (6 Credits)
Investigations into the relationship between the man-made and the natural world including introductory issues of assembly and material value. Design of the site and the building are combined into an integral process delimiting and probing the boundaries of each and exploring their reciprocal relationship. The architect's obligations to the natural and urban contexts are explored in many dimensions including historical, typological, environmental, and physical.
Prerequisite: Minimum grade of C- in ARCH405.
Restriction: Must be in Architecture (Master's) program.

ARCH407 Graduate Architecture Design IV (6 Credits)
Studio problems and theories concentrating on urbanism and urban design techniques. Issues and sites range from high-density urban in-fill to suburban and greenfield development in American and other contexts. Studio theories explore such topics as Contextualism, Neo-Traditional design, Transit Oriented Development, density, sustainable development, building typology, and street design.
Prerequisite: Minimum grade of C- in ARCH406.
Restriction: Must be in Architecture (Master's) program.

ARCH408 Special Topics Architecture Design Studio (6 Credits)
Design Studio course to examine topical problems in architecture and urban design.
Restriction: Must be in a major in ARCH-Architecture Program; and permission of ARCH-Architecture Program.
Repeatable to: 12 credits if content differs.
Additional Information: May also be taken for repeat credit for ARCH400, ARCH401, ARCH402, or ARCH403 only by permission of Architecture Program Director.

ARCH410 Architecture Technology I (4 Credits)
First course in a four course sequence which develops the knowledge and skills of architectural technology. Addresses climate, human responses to climate, available materials, topography and impact on culture. Principles of assembly, basic structural principles and philosophies of construction.
Prerequisite: MATH120 or MATH140; or must have completed MATH220. And PHYS121; and (GEOG140, GEOG123, GEOL120, AOSC123, GEOL123, or BSCI205).
Corequisite: ARCH400.
Restriction: Must be in Architecture (B.S.) program.

ARCH413 Architecture Technology IV (4 Credits)
Final course in a four course sequence. Theory, quantification, and architectural design applications for HVAC, water systems, fire protection electrical systems, illumination, signal equipment, and transportation systems.
Prerequisite: ARCH412.
Corequisite: ARCH403.
Restriction: Must be in Architecture (B.S.) program.

ARCH418 Selected Topics in Architectural Technology (3 Credits)
Selected Topics in Architectural Technology
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH419 Independent Studies in Architectural Technology (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH420 History of American Architecture (3 Credits)
American architecture from the late 17th to the 21st century.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture program.

ARCH422 History of Greek Architecture (3 Credits)
Survey of Greek architecture from 750-100 B.C.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.

ARCH423 History of Roman Architecture (3 Credits)
Survey of Roman architecture from 500 B.C. To A.D. 325.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.

ARCH425 History of Architecture I (3 Credits)
Pre-1500 World Architecture survey course - History of Architecture structured to develop critical thinking and visually literacy with regard to the worldwide legacy of design thinking and cultural production through architecture. Structured to nurture critical thinking and visually literacy with regard to the worldwide legacy of architecture. The work in the course will involve the evaluation of sources and arguments in reading architectural history. Architecture will be framed relative to ways of thinking, religious beliefs, cultural heritage, and cultural values.
Restriction: Permission of ARCH-Architecture Program.
Credit Only Granted for: ARCH225 or ARCH425.
Additional Information: Graduate architecture history course requires additional recitation section and additional coursework tied to survey lectures.

ARCH426 History of Architecture II (3 Credits)
Post-1500 - History of Architecture survey course - History of Architecture structured to develop critical thinking and visually literacy with regard to the worldwide legacy of design thinking and building innovation in architecture. Structured to nurture critical thinking and visually literacy with regard to the worldwide legacy of architecture. The work in the course will involve the evaluation of sources and arguments in reading architectural history. Architecture will be framed relative to ways of thinking, religious beliefs, cultural heritage, and cultural values.
Restriction: Permission of ARCH-Architecture Program.
Credit Only Granted for: ARCH226 or ARCH426.
Additional Information: Graduate architecture history course requires additional recitation section and additional coursework tied to survey lectures.

ARCH427 Theories of Architecture (3 Credits)
Survey of architectural theories - theories of architectural design, representation and urban design from antiquity to the present day.
Prerequisite: ARCH426; or permission of ARCH-Architecture Program.
Restriction: Must be in Architecture (B.S.) program.

ARCH428 Selected Topics in Architectural History (1-4 Credits)
Selected Topics in Architectural History
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH429 Independent Studies in Architectural History (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH430 Measuring Sustainability in Architecture (3 Credits)
Studies metrics of sustainability as included in rating standards, including LEED. All students will take the LEED GA test.
Credit Only Granted for: ARCH430 or ARCH418M.
Formerly: ARCH418M.

ARCH433 History of Renaissance Architecture (3 Credits)
Renaissance architectural principles and trends in the 15th and 16th centuries and their modifications in the Baroque period.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.

ARCH435 History of Contemporary Architecture (3 Credits)
Architectural history from World War II to the present.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.

ARCH443 Visual Communication For Architects (3 Credits)
Investigation of the relationship between drawing from life and architectural drawing, the conventions of architectural drawing and the role of architectural drawing as a means to develop, communicate, and generate architectural ideas.
Corequisite: ARCH400.
Restriction: Must be in Architecture (Master's) program; and must be in the 3.5 year M. ARCH program.

ARCH445 Visual Analysis of Architecture (3 Credits)
Study of visual principles of architectural and urban precedents through graphic analysis. Exercises include on-site observation, documentation and analysis. Focuses on the development of an architect's sketchbook as a tool for life-long learning.
Prerequisite: ARCH400; or permission of ARCH-Architecture Program.
Restriction: Must be in Architecture (B.S.) program.

ARCH448 Selected Topics in Visual Studies in Architecture (3 Credits)
Selected Topics in Visual Studies in Architecture
Restriction: Permission of ARCH-Architecture Program; and must be in a major in ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH449 Independent Studies in Visual Studies in Architecture (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program; and must be in a major in ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH456 Great Cities (3 Credits)
Case studies from a selection of the great cities of the world.
Prerequisite: Permission of ARCH-Architecture Program.

ARCH458 Selected Topics in Urban Design (3 Credits)
Selected Topics in Urban Design
Restriction: Must be in a major in ARCH-Architecture Program; and permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH459 Independent Studies in Urban Design (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Must be in a major in ARCH-Architecture Program; and permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH460 Site Analysis and Design (3 Credits)
Principles and methods of site analysis; the influence of natural and man-made site factors on site design and architectural form.
Restriction: Must be in the Master of Architecture program; or permission of the School of Architecture, Planning and Preservation.

ARCH461 Sustainability in Architecture (3 Credits)
Strategies of sustainability as related to the broader context of architectural problem solving.
Restriction: Permission of ARCH-Architecture Program.
Credit Only Granted for: ARCH418S or ARCH461.
Formerly: ARCH418S.

ARCH462 Methods & Materials of Building Construction (3 Credits)
Building Construction methods and materials are examined through case studies to explore the means and techniques applied to the material execution of buildings and BIM. Focus on an understanding of the organization of the design and construction process and awareness of building and zoning codes, material systems and types.
Prerequisite: PHYS121 or equivalent; and MATH120 or MATH140 or equivalent; or permission of the ARCH-Architecture Program.
Restriction: Must be in a major in undergraduate or graduate ARCH program or Construction Project Management Minor.
Credit Only Granted for: ARCH410 or ARCH462.

ARCH463 Sustainable Systems in Architecture (3 Credits)
Sustainable systems in architecture examines the nature of the global problem, environmental economics, understanding the local environment, bioclimatic design, solar control and shading, solar access zoning, residential scale energy design issues, commercial scale energy design issues, and urban scale energy design issues.
Prerequisite: ARCH462.
Restriction: Must be in a major in undergraduate or graduate ARCH program.

ARCH464 Architectural Structures I (3 Credits)
This course covers the basic principles of architectural structures, including the influence of geometric, sectional, and material properties related to flexure and shear in beam and framed systems; vector mechanics with application to analysis of trusses, catenaries, and arches; diagrammatic analysis of beams for bending moment, shear, and deflection as well as the study of structural framing systems for vertical and lateral loads.
Prerequisite: ARCH462, ARCH463, and PHYS121; and MATH120 or MATH140, or equivalent; or permission of the ARCH-Architecture Program.
Corequisite: ARCH401 or ARCH406.
Restriction: Must be in either BS in Architecture or M.Architecture Program.
Credit Only Granted for: ARCH411 or ARCH464.

ARCH465 Architectural Structures II (3 Credits)
The basic principles of elastic behavior for different materials such as wood, steel, concrete, and composite materials and compares the properties and applications of materials generally will be covered. It investigates cross sectional stress and strain behavior in flexure and in shear, and torsion as well as the stability of beams and columns. The qualitative behavior of combined stresses and fracture in materials is also covered.
Prerequisite: ARCH464 and PHYS121; and MATH120 or MATH140, or equivalent; or permission of the ARCH-Architecture Program.
Restriction: Must be in either BS in Architecture or M. Architecture Program.
Credit Only Granted for: ARCH412 or ARCH465.

ARCH466 Environmental Systems in Architecture (3 Credits)
Environmental systems in architecture presents the theory, quantification, and architectural design implications for heating ventilating and air conditioning, water and waste, fire protection, electricity, illumination, acoustics, and vertical transportation.
Prerequisite: ARCH462 and ARCH463.
Corequisite: ARCH403 or ARCH406.
Restriction: Must be in either BS in Architecture or M. Architecture Program.
Credit Only Granted for: ARCH413 or ARCH466.

ARCH467 Integrated Project Delivery (3 Credits)
Integrated Project Delivery is examined from design to implementation through an exploration of building construction, architectural design and construction management perspectives.
Restriction: Must be in a major in ARCH-Architecture Program; or must be in Construction Project Management Minor.

ARCH470 Computer Applications in Architecture (3 Credits)
Introduction to computer utilization, with emphasis on architectural applications.
Prerequisite: ARCH400; or permission of ARCH-Architecture Program.
Restriction: Must be in Architecture (B.S.) program.

ARCH472 Building Information Modeling Communication and Collaboration (3 Credits)
Building Information Modeling is explored as pertains to collaboration and communication in the design and construction of buildings and building systems. Practical and empirical learning using BIM software and case studies of real world projects and construction scenarios.
Restriction: Must be in a major in ARCH-Architecture Program; or must be in the Construction Project Management Minor.
Credit Only Granted for: ARCH678I or ARCH472.
Formerly: ARCH678I.

ARCH474 Integrated Education in Architecture NAAB/IDP (1 Credit)
Examine National Architectural Accrediting Board (NAAB) student performance criteria in the context of architectural education. Contextualize NAAB accredited curricula and examine the relationship to graduate study and professional practice, including the Intern Development Program (IDP) of the National Council of Architectural Registration Boards (NCARB).
Restriction: Must be in a major in ARCH-Architecture Program.

ARCH478 Selected Topics in Architecture (1-4 Credits)
Selected Topics in Architecture
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH479 Independent Studies in Architecture (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH481 The Architect in Archaeology (3 Credits)
The role of the architect in field archaeology and the analysis of excavating, recording, and publishing selected archaeological expeditions.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.

ARCH482 The Archaeology of Roman and Byzantine Palestine (3 Credits)
Archaeological sites in Palestine (Israel and Jordan) from the reign of Herod the Great to the Moslem conquest.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.

ARCH483 Field Archaeology (3 Credits)
Participation in field archaeology with an excavation officially recognized by proper authorities of local government.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.

ARCH488 Selected Topics in Architectural Preservation (1-4 Credits)
Selected Topics in Architectural Preservation.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH489 Independent Studies in Architectural Preservation (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH600 Integrated Design Studio V (6 Credits)
Integrated and comprehensive building and site design. Course content bridges the gap between design and technology, between practice and education, in a studio setting. Explorations include the integration of conceptual and technical aspects of architectural form and assembly, highlighting the ways in which multiple layers of a building design are developed, coordinated and resolved.
Corequisite: ARCH611.
Restriction: Permission of ARCH-Architecture Program.

ARCH601 Topical Design Studio VI (6 Credits)
Topical architectural design studio with concentration on advanced topical inquiry addressing but not limited to: architectural competitions, sustainable design, theoretica/conceptual issues, programmatic, contextual, and/or technical issues.
Restriction: Permission of ARCH-Architecture Program.

ARCH608 Advance Special Topics Design Studio (6 Credits)
Topical architectural design studio with concentration on advanced theoretical, conceptual, technological, cultural or professional issue.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 12 credits if content differs.
Additional Information: Elective Architecture Design Studio that may be taken for repeat or advanced credit in place of ARCH404, ARCH405, ARCH406, ARCH407, ARCH600, ARCH601, ARCH700 or an additional design studio.

ARCH611 Advanced Architecture Technology Seminar (3 Credits)
Technology in design of buildings. Application of technological issues in building design; integration of technology in architecture; technology as a form determinant in architecture; other conceptual and philosophical issues related to the application of technology in the design, construction, and use of buildings.
Corequisite: ARCH600.
Restriction: Permission of ARCH-Architecture Program.

ARCH628 Selected Topics in Architectural History (1-4 Credits)
Graduate Selected Topics in Architectural History
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH629 Graduate Independent Studies in Architectural History (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH635 Seminar in the History of Modern Architecture (3 Credits)
Advanced investigation of historical problems in modern architecture.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.

ARCH654 Urban Development and Design Theory (3 Credits)
Advanced investigation into the history, and practice of urban design, planning, and development.
Prerequisite: ARCH225 and ARCH226; or ARCH425 and ARCH426; or permission of the ARCH-Architecture Program.
Restriction: Permission of ARCH-Architecture Program.

ARCH655 Urban Design Seminar (3 Credits)
Advanced investigation into problems of analysis and evaluation of the design of urban areas, spaces, and complexes with emphasis on physical and social considerations; effects of public policies through case studies. Field observations.
Prerequisite: ARCH654; or permission of ARCH-Architecture Program.
Credit Only Granted for: ARCH451 or ARCH655.
Formerly: ARCH451.

ARCH670 Advanced Computer Applications in Architecture (3 Credits)
Advanced use of computer technology in design. Use of digital design processes and conceptual methodologies to study design alternatives and realization. Methods and techniques of digital design representation, simulation, or fabrication to explore and test concepts and integration of digital technologies into the architectural design process.
Restriction: Permission of ARCH-Architecture Program.
Credit Only Granted for: ARCH678C or ARCH670.
Formerly: ARCH678C.

ARCH671 BIM Technology and Processes in Architecture (3 Credits)
Building Information Modeling is examined in depth relative to Integrated Project Delivery methods as pertains to collaboration and communication in the design and construction of buildings and building systems. Practical and empirical learning using BIM software and case studies of real world projects and construction scenarios.
Prerequisite: ARCH403; and ARCH470. Or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ARCH678I or ARCH670.
Formerly: ARCH678I.

ARCH672 Type and Typology Seminar (3 Credits)
The idea of type and typology, its implications for theory, scholarship, and practice in achitecture and urban design.
Restriction: Permission of ARCH-Architecture Program.

ARCH673 Building Culture Seminar (3 Credits)
Comprehension of major themes in the development of architectural building techniques and culture value systems in architecture are developed through lecture, discussion and analysis of seminal readings and buildings.
Restriction: Permission of ARCH-Architecture Program.

ARCH674 Seminar in Regionalism (3 Credits)
Regional characterisitics of culture, climate, and landscape as determinants world architecture.
Restriction: Permission of ARCH-Architecture Program.

ARCH676 Field Research in Architecture (3 Credits)
Recording and analysis of significant architectural complexes in situ.
Restriction: Permission of ARCH-Architecture Program.

ARCH678 Advanced Selected Topics in Architecture (1-4 Credits)
Graduate Selected Topics in Architecture.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH679 Advanced Independent Studies in Architecture (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH688 Advanced Selected Topics in Architectural Technologies (1-4 Credits)
Graduate Selected Topics in Architectural Technologies.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH689 Advanced Independent Studies in Architectural Technologies (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH700 Urban Design Studio VII (6 Credits)
Studio problems and theories concentrating on urbanism and urban design techniques. Issues and sites range from high density urban in-fill to suburban and greenfield development in American and other contexts. Studio theories explore such topics as Contextualism, Neo-Traditional design, Transit-Oriented Development, density, sustainable development building typology, and street design.
Restriction: Permission of ARCH-Architecture Program.

ARCH770 Professional Practice of Architecture (3 Credits)
Project management, organizational, legal, economic and ethical aspects of architecture.
Restriction: Permission of ARCH-Architecture Program.

ARCH778 Graduate Selected Topics in Urban Design (1-4 Credits)
Graduate Selected Topics in Urban Design.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH779 Advanced Independent Studies in Urban Design (1-4 Credits)
Proposed work must have a faculty sponsor and receive approval of the Architecture Program Curriculum Committee.
Restriction: Permission of ARCH-Architecture Program.
Repeatable to: 6 credits if content differs.

ARCH797 Thesis Proseminar (3 Credits)
Directed research and preparation of thesis program.
Prerequisite: ARCH601.

ARCH798 Thesis in Architecture (3 Credits)
Complements the research of ARCH 799, with presentation of the design research to student's thesis committee.
Prerequisite: ARCH797.
Corequisite: ARCH799.
Restriction: Must be in Architecture (Master's) program; and permission of ARCH-Architecture Program; and minimum cumulative GPA of 3.0.

ARCH799 Master's Thesis Research (1-6 Credits)
Development of master's thesis.
Prerequisite: ARCH797.
Corequisite: ARCH798.
Restriction: Must be in Architecture (Master's) program; and permission of ARCH-Architecture Program; and minimum cumulative GPA of 3.0.
Repeatable to: 6 credits if content differs.

AREC - Agricultural and Resource Economics

AREC405 Economics of Production (3 Credits)
The use and application of production economics in analysis of firm and policy decisions. Production functions, cost functions, multiple product and joint production, and production processes through time.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC422 Econometric Analysis in Agricultural and Environmental Economics (3 Credits)
This course offers a hands-on introduction to econometrics. Students will explore the linear regression model from the ground up by analyzing real-world datasets and learning how to distinguish causation from correlation. They will gain practical experience using econometrics to address important questions in agricultural economics and environmental economics.
Prerequisite: 1 course from (AREC326 or ECON326); and 1 course from (ECON230, ECON321, or BMGT230).
Credit Only Granted for: ECON422, ECON424, or AREC422.

AREC426 Economic Methods and Food Consumption Policy (3 Credits)
An overview of major econometric tools used by policy makers, economists and social scientists to analyze the effects of food consumption policy. Major food assistance programs in the United States such as SNAP, the School Lunch Program and the School Breakfast Program will be discussed.
Prerequisite: AREC326; or ECON326.
Credit Only Granted for: AREC489O or AREC426.
Formerly: AREC489O.

AREC427 Commodity Pricing and Markets (3 Credits)
Economic theory as applied to the marketing of agricultural commodities. How commodity prices vary with current demand and production, and how prices are linked over time, across space, and across grades.
The role played by contractual arrangements, cooperative marketing, vertical integration, and governmental policies in commodity marketing strategies.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC430 Introduction to Agricultural and Resource Law (3 Credits)
Survey of law with emphasis on problems and applications related to agricultural and natural resource economics. The course emphasizes strategies for managing legal risk arising from ownership, management, and use of agricultural resources. Students will get practical information to utilize in personal or professional settings. Contract law, constitutional law, tort law, property law, real estate transactions, business organization, estate planning, and debtor.
Prerequisite: ECON326 or AREC326.
Credit Only Granted for: AREC430 or AREC489K.
Formerly: AREC489K.

AREC431 Agricultural Water Quality: Policy and Legal Issues (3 Credits)
An overview of the American and Maryland legal systems and sources of legal information as it pertains to water quality and agriculture.
Prerequisite: AREC326; or ECON326; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: AREC489L or AREC431.
Formerly: AREC489L.

AREC433 Food and Agricultural Policy (3 Credits)
Economic and political context of governmental involvement in the farm and food sector. Historical programs and current policy issues. Analysis of economic effects of agricultural programs, their benefits and costs, and comparison of policy alternatives. Analyzes the interrelationship among international development, agricultural trade and general economic and domestic agricultural policies.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC435 Commodity Futures and Options (3 Credits)
The economics and institutional features of commodity futures and options markets. Students will develop a basic understanding of the underlying price relationships between cash and futures markets and will apply this information to business risk management decision making.
Prerequisite: AREC326; or ECON326; or students who have taken courses with comparable content may contact the department.

AREC445 Agricultural Development, Population Growth and the Environment (3 Credits)
Development theories, the role of agriculture in economic development, the agricultural policy environment, policies impacting on rural income and equity, environmental impacts of agricultural development.
Prerequisite: ECON326 or AREC326; or students who have taken courses with comparable content may contact the department.

AREC446 Sustainable Economic Development (3 Credits)
Examine why socially equitable and environmentally sustainable economic growth is difficult to achieve. It explores the interactive dynamics of environmental degradation, human capital, inequality and institutions. Emphasis is on the role of market imperfections and political failure in explaining the persistence of extractive economic institutions that hinder sustainable development.
Prerequisite: AREC326; or ECON326; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: AREC446 or AREC489G.
Formerly: AREC489G.

AREC447 The Economy of China (3 Credits)
An introductory survey course of economic development in China with emphasis on understanding the process of economic reform in mainland China since 1978.
Prerequisite: AREC326, ECON306, or ECON326.
Restriction: Must be in one of the following programs (Agricultural and Resource Economics; Agricultural and Resource Economics: Agribusiness).

AREC453 Natural Resources and Public Policy (3 Credits)
Rational use and reuse of natural resources. Theory, methodology, and policies concerned with the allocation of natural resources among alternative uses. Optimum state of conservation, market failure, safe minimum standard, and cost-benefit analysis.
Prerequisite: AREC326, ECON306, or ECON326; and (BMGT230 or ECON230).
Restriction: Must be in one of the following programs (Agricultural and Resource Economics; Agricultural and Resource Economics: Agribusiness; Agricultural and Resource Economics: Environmental and Resource Economics; Economics Bachelor of Arts; Environmental Science & Policy-Env Economics). Cross-listed with ECON453.
Credit Only Granted for: AREC453 or ECON453.

AREC454 The Economics of Climate Change (3 Credits)
The role of economics in the formation of climate policy; basic concepts of environmental economics including efficiency, externalities, and policy instruments; economic models of intertemporal decisions and decision making in the face of uncertainty. Applied economic analysis of specific issues and current policy initiatives.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230). Cross-listed with: ECON484.
Credit Only Granted for: AREC454 or ECON484.

AREC455 Economics of Land Use (3 Credits)
Fundamentals of location theory. Microeconomics of land use decisions, including determination of rent and hedonic pricing models. Impacts of government decisions on land use, including regulation (e.g., zoning), incentives (transferable development rights), provision of public services, and infrastructure investments. Impacts of land use on environmental quality, including issues relating to sprawl, agricultural land preservation, and other topics of special interest.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230). Cross-listed with: ECON485.
Credit Only Granted for: AREC455 or ECON485.

AREC456 Energy and Environmental Economics (3 Credits)
Economic theory and empirical methods are used to study problems of energy, the environment, and the economy. It examines the extraction, production, and use of energy and market institutions and regulatory approaches used to correct market failures. Topics covered include: oil and natural gas markets, management and design of electricity markets, renewable energy, non-market valuation , climate change, and transportation policies.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230). Cross-listed with: ECON486.
Credit Only Granted for: AREC456 or ECON486.

AREC457 Energy, Climate Change, and Options for a Low-Carbon Economy (3 Credits)
Provides a primer in the physics and atmospheric chemistry of climate change, describes what the effects of climate change may be and explains how energy generation and use in various sectors of the economy contribute to greenhouse gas. It presents policy options meant to curb the use of fossil fuels (e.g., carbon taxes), improve energy efficiency (e.g., standards and incentives), and identifies possible drawbacks or unintended effects of such policies. Students will also study adaptation from the engineering, policy and anthropology points of view. The course further covers other aspects of climate change, as the potential effect of climate change on human health, cultural artifacts and the built environment, and sensitive ecological systems, and the legal implications of carbon storage options.
Recommended: ECON200. And AREC326; or ECON326.
Restriction: Junior standing or higher.

AREC481 Environmental Economics (3 Credits)
An exploration of the use of economic incentives for protection of the environment and the determination of appropriate (or efficient) level of environmental quality. Also covers the choice of policy instruments for the attainment of environmental standards.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230).
Restriction: Must be in one of the following programs (Agricultural and Resource Economics; Agricultural and Resource Economics: Agribusiness; Environmental Science & Policy-Env Economics; Agricultural and Resource Economics: Environmental and Resource Economics; Economics Bachelor of Arts program). Cross-listed with: ECON481.
Credit Only Granted for: ECON481 or AREC481.

AREC489 Special Topics in Agricultural and Resources Economics (3 Credits)
Repeatable to: 9 credits.

AREC610 Microeconomic Applications in Agricultural and Resource Markets (3 Credits)
Applications of graduate level microeconomic analysis to the problems of agricultural and natural resource production and distribution including demand for agricultural output, the nature of agricultural supply decisions, decision making under uncertainty, valuation of natural resources, and exploitation of natural resources.
Prerequisite: ECON603.

AREC620 Optimization in Agricultural and Resource Economics (3 Credits)
Mathematical theory of static and dynamic optimization as applied to the economics of agriculture, natural resources and the environment. Topics include necessary and sufficient conditions for constrained optimization, convexity and concavity, duality and the envelope theorem, comparative statics, fixed point theorems, optimal control theory and dynamic programming.
Prerequisite: Must have completed Multivariate calculus and matrix or linear algebra.

AREC623 Applied Econometrics I (4 Credits)
A modern introduction to empirical strategies in applied microeconomic research in public policy, development economics, labor economics, education, marketing and corporate finance. Emphasis on causal reasoning and design-driven identification in the social sciences. Concepts and applications will focus on addressing economically meaningful causal questions. Basic theoretical and mathematical aspects of probability and statistics will be developed to assess the significance of the relationship among economic variables. Topics include: the approximation of the conditional expectation function through a linear predictor (Ordinary Least Squares), the effects of omitted variables and the usefulness of variables that resemble the outcome of a randomized experiment (Instrumental Variables), as well as extensions to high-dimensional big-data counterparts. Fundamental concepts in sampling theory, statistical inference (with small and large samples) and hypothesis testing will be studied and applied to real data using Stata, a general-purpose statistical software.
Prerequisite: Introductory statistics or econometrics, linear algebra, and differential/calculus; or permission of instructor.
Additional Information: Intended for first-year Ph.D. students from AREC, BUFN, ECON, EDMS, EDUC, PLCY and URSP departments with a background in introductory statistics or econometrics.

AREC624 Applied Econometrics II (4 Credits)
Variations of the standard linear model, simultaneous equations estimation, nonlinear regression, nonlinear simultaneous equations estimation, static and dynamic panel data models, errors in variables, Hausman tests, discrete choice models such as conditional multinomial and mixed logit models, latent class models, semi-parametric estimation, varying parameter models, unobserved variables, time series models, and model selection procedures.
Prerequisite: AREC623.

AREC699 Special Problems in Agricultural and Resource Economics (1-2 Credits)
Intensive study and analysis of specific problems in the field of agricultural and resource economics, providing in-depth information in areas of special interest to the student.

AREC783 Environmental Taxation and Regulation (3 Credits)
The economics of policies to address environmental externalities. Specific topics include the theory of public goods and externalities, cost-benefit and cost-effectiveness analysis of environmental regulations, regulatory instrument choice under uncertainty, environmental policy in an economy with pre-existing tax distortions, monitoring and enforcement of environmental regulations, distributional effects of environmental policy, and regulation of intertemporal externalities.
Prerequisite: ECON603 and ECON604; and graduate-level econometrics.
Credit Only Granted for: AREC783 or AREC869W.
Formerly: AREC869W.

AREC784 Energy Economics, Empirical Industrial Organization, and Public Policy (3 Credits)
Energy markets and public policy, evaluating techniques for estimating market demand and supply and for evaluating policy intervention. Comparison of reduced-form and structural approaches. Applications may include but are not limited to electricity, oil and other liquid fuels, and household travel, with examples from the United States and other countries.
Prerequisite: ECON603, AREC623, and AREC624; or permission of instructor.

AREC785 Advanced Economics of Natural Resources (3 Credits)
The use of exhaustible and renewable natural resources from normative and positive points of view. Analysis of dynamic resource problems emphasizing energy, mineral, groundwater, forestry, and fishery resources; optimal, equilibrium, and intergenerational models of resource allocation.
Prerequisite: Permission of AGNR-Agricultural & Resource Economics department; or (ECON603 and AREC623). Cross-listed with ECON785.
Credit Only Granted for: AREC785 or ECON785.

AREC799 Master's Thesis Research (1-6 Credits)

AREC815 Experimental and Behavioral Economics (3 Credits)
An overview of the design, implementation, and analysis of experiments motivated by behavioral economics, with a particular focus on experiments in field settings. Topics covered include social preferences, risk aversion, prospect theory, present bias, overconfidence, and limited attention.
Prerequisite: AREC623, AREC624, ECON603, and ECON604; or equivalent.
Credit Only Granted for: AREC815 or AREC869A.
Formerly: AREC869A.

AREC825 Advanced Economic Welfare Analysis (3 Credits)
Theory of economic welfare measurement, problems of path dependence in evaluating multiple price changes, welfare measurement under risk, general equilibrium welfare measurement with multiple distortions, and applications in evaluation of agricultural and resource policies.
Credit Only Granted for: AREC625 or AREC825.

AREC829 Policy Design and Causal Inference for Social Science (3 Credits)
A course in applied econometrics that examines empirical strategies in applied microeconomic research used to estimate the effects of a policy or program on the outcomes of interest in fields like public policy, development economics, labor economics, education, marketing and corporate finance, as well as in industry and international organizations. Methods in applied econometrics with a focus on the thought experiment, the hypothetical experiment that should be used to answer the causal question of interest. A taxonomy of departures from the experimental ideal is presented, as well as the assumptions required to mimic the conditions of the unfeasible experiment from observational data. Topics include regression and matching, instrumental variables and natural experiments, differences-in-differences, change-in-changes, synthetic control methods and regression discontinuity designs. Causal parameters defined from conditional moments, and quantiles and effects on conditional distributions (for inequality and poverty assessment) are considered. Stata, a general-purpose statistical software widely used by applied economists, is used to develop concepts and applications.
Prerequisite: AREC623; or permission of instructor.
Repeatable to: 9 credits if content differs.
Additional Information: The course is intended for second-year Ph.D. students from AREC, BUFN, ECON, EDMS, EDUC, PLCY and URSP who have a background in quantitative methods comparable to that offered in an introductory micro-econometrics class.

AREC832 Agricultural Policy Analysis (3 Credits)
The economics of agricultural policies. The impact of agricultural policies on both historic and modern growth, including discussion of optimal farm and ownership structure. Contemporary policy issues in both developed and developing countries. Additional topics in trade, environment, and commodity markets.
Credit Only Granted for: AREC632 or AREC832.

AREC845 Environment and Development Economics (3 Credits)
Considers neoclassical and endogenous growth models; international trade theory; the role of property right institutions and factor markets; the environmental impact of trade liberalization in developing countries and the environmental effects of increasing international capital mobility; empirical studies relating the environment to growth and globalization; and policy analyses.

AREC846 Development Microeconomics (3 Credits)
Development economics with focus on issues applicable to rural development and agriculture in developing countries. Content includes both theory and empirical application of theory. Subjects covered include economics of agricultural households, credit and insurance markets, technological progress and learning and institutional economics of developing countries.
Prerequisite: AREC624, ECON603, and AREC623; or equivalent.
Formerly: AREC869E.

AREC847 Networks, Social Learning and Technology Adoption (3 Credits)
This class will focus on networks, learning from others, and peer effects and the role ofeach in human capital accumulation, technology adoption and behavior. The material isfocused on applications of education, health agriculture and entrepreneurship in developingcountries, but will draw heavily from literatures on these effects in developed countries aswell. The class will cover the theory of networks and learning but its primary focus will beon the empirical difficulty of identifying these effects and establishing causality.
Prerequisite: AREC624, AREC623, and ECON603; and students who have taken courses with comparable content may contact the department.

AREC869 Advanced Topics in Agricultural and Resource Economics (1-3 Credits)
Frontiers of research in environmental and resource economics; agricultural policy, production, and trade; and development. Topics may include decision making under risk and related market institutions, principal agent analysis, optimal policy design, technology adoption, market structure, land and credit markets, information markets, and income distribution.
Repeatable to: 9 credits if content differs.

AREC891 Introduction to Prospectus Development (1 Credit)
Critical evaluation of research, prospectus topic exploration including literature review, data identification, model development, and related presentations. Required of all second-year Ph.D. students.
Prerequisite: Completion of the first year of graduate study in AREC.
Credit Only Granted for: AREC 869K or AREC 891.
Formerly: AREC869K.

AREC892 Dissertation Prospectus Development (3 Credits)
Presentations of proposed dissertation research including literature review, model development, data identification, and written prospectus development. Required of all third-year Ph.D. students.
Prerequisite: Completion of two years of the AREC Ph.D. program.
Credit Only Granted for: AREC 869P or AREC 892.
Formerly: AREC869P.

AREC898 Pre-Candidacy Research (1-8 Credits)

AREC899 Doctoral Dissertation Research (1-8 Credits)

ARHU - Arts and Humanities

ARHU439 Interdisciplinary Studies in Arts and Humanities (3 Credits)
An interdisciplinary exploration of chronological, geographical or thematic topics in Arts and Humanities.
Repeatable to: 6 credits if content differs.

ARHU440 Arts Leadership Seminar (3 Credits)
An advanced seminar in arts leadership exposing students to the foundations of arts leadership in not-for-profit organizations as it intersects with current trends in technology, demographics, government policy, and the economy. In case studies based on examples drawn from local arts organizations, students will learn about audience engagement as well as institutional development terminology and best practices.Cross-listed with: TDPS440.
Credit Only Granted for: TDPS4440 or ARHU440.

ARHU458 Graduate School Preparation (1 Credit)
Designed for Juniors and Seniors who are interested in applying to graduate school. Topics include skills needed for the graduate school search and application process, evaluation and reflection of application materials, preparation for GRE exam, and exploration into career options after graduate school. Focus on the Humanities fields.
Restriction: Must have earned a minimum of 45 credits.
Repeatable to: 3 credits if content differs.

ARHU468 Peer Mentoring Program (1 Credit)
A workshop for sophomore, junior or senior students who wish to serve as peer mentors helping first-year students to cope with the numerous issues which often arise in the transition to the university.
Restriction: Sophomore standing or higher; and permission of ARHU-College of Arts & Humanities.
Repeatable to: 3 credits if content differs.

ARHU486 Internship Practicum in Arts and Humanities (3-6 Credits)
An internship intended for students who have already completed an internship for credit. ARHU486 must be a different experience from the internship students have already taken for credit. Generally students intern with a different company, but they may continue working for the same company if the job is significantly different. See ARHU internship coordinator for details.
Prerequisite: Have completed previous internship at U of MD.
Restriction: Must be in a major in ARHU-College of Arts & Humanities; and permission of ARHU-College of Arts & Humanities; and minimum cumulative GPA of 2.5; and must have earned a minimum of 60 credits; and completed 12 credits at U of MD.

ARHU489 Advanced Internship Practicum in ARHU (3-6 Credits)
Designed for students who have already completed at least 2 upper level internship courses for academic credit. It is an advanced practicum to assist students in continuing to develop and hone their professional writing, presentation and analytical skills.
Prerequisite: ARHU486.
Restriction: Must be in a major in ARHU-College of Arts & Humanities; and minimum cumulative GPA of 2.5; and permission of instructor.
Repeatable to: 6 credits if content differs.
Additional Information: Course is designed to follow ARHU486.

ARHU498 Special Topics in Arts and Humanities (3 Credits)
Repeatable to: 6 credits if content differs.

ARHU786 Leadership and Professional Development Internship (1-6 Credits)
Professional development for graduate students interested in careers in non-academic organizations and in administrative positions in academic institutions. See department graduate program director for internship guidelines and applicability to graduate program requirements.
Prerequisite: Must have completed one semester of full-time graduate study; and permission of ARHU-College of Arts & Humanities.

ARHU788 Profession Development Seminar (1-3 Credits)
Professional development for academic and non-academic careers in the arts and humanities.
Repeatable to: 9 credits if content differs.

ARHU789 Professional Development Practicum (1-6 Credits)
Graduate students, in various disciplines within the college of Arts and Humanities, will learn the theory and principles of a specific issue or skill set related to academic or non-academic work. They will create original work in a hands-on practicum format.
Restriction: Must have completed at least the equivalent of one year of full-time graduate study; and permission of instructor.
Repeatable to: 6 credits if content differs.

ARMY - Army

ARMY401 Advanced Military Leadership III (3 Credits)
Introduces contracted students to the study of Army structure, practices and processes exercised by Army Commanders and Staff in completing personnel, logistics, training and combat operations. Includes a laboratory in applied leadership skills and two field exercises.

ARMY402 Advanced Military Leadership IV (3 Credits)
The military system and code of ethics in the military environment is studied. Topics include code of conduct during all forms of military operations, the Geneva Conventions and the ethical decision making process. Also includes a laboratory in applied leadership skills, fitness excellence and two field exercises.

ARSC - Air Science

ARSC400 National Security Forces in Contemporary American Society I (3 Credits)
Study of American national security policy and processes to include information and implementation, impact of major national and international actors, and development of major policy issues. This course will satisfy credit towards a minor in military studies.
Prerequisite: Permission of UGST-AFROTC-Air Science; or (ARSC300 or ARSC301).
Corequisite: ARSC059; or permission of UGST-AFROTC-Air Science.
Restriction: Senior standing.

ARSC401 National Security Forces in Contemporary American Society II (3 Credits)
This course examines various subjects including: military law/justice, preparation for active duty, and current issues affecting military professionalism. This course will satisfy credit towards a minor in military studies.
Prerequisite: ARSC300 or ARSC301; or permission of UGST-AFROTC-Air Science.
Corequisite: ARSC059; or permission of UGST-AFROTC-Air Science.
Restriction: Senior standing.

ARTH - Art History & Archaeology

ARTH418 Special Problems in Italian Renaissance Art (3 Credits)
Focus upon aspects of painting, sculpture, and architecture of Renaissance.
Repeatable to: 6 credits if content differs.

ARTH426 Renaissance and Baroque Sculpture in Northern Europe (3 Credits)
Sculpture in France, Germany, England, and the Low Countries from the fourteenth to the seventeenth century.

ARTH456 Photography Since World War II (3 Credits)
An exploration of the many uses and meanings of photography since 1945.

ARTH466 Feminist Perspectives on Women in Art (3 Credits)
Principal focus on European and American women artists of the 19th and 20th centuries, in the context of the new scholarship on women.

ARTH472 Ecuador: Andean Spaces-Traversing the Colonial City and the Natural World (3 Credits)
Introduces students to the history and cultures of Ecuador from the colonial period to the beginning of the 19th century. By studying the socio-spatial configuration of the colonial city as exemplified by Quito, students will be immersed in the art, architecture, and other rich cultural legacies of Ecuador. Quito, a World Heritage site, offers students visually stunning churches, monasteries, colonial squares, a famed tradition of Baroque painting and sculptures, and vibrant indigenous and mestizo communities. As a contrast, students will explore also travel narratives that represent the natural Andean world while visiting Quito's surrounding areas. This course will interrogate the European influence on urban design and representations of the landscape of the Americas. Understanding this colonial past enhances the understanding of the modern history of the Andean region and Latin America as a whole. The students will gain a full appreciation of the European and Indigenous living heritage that composes the region today. Taught in English.Cross-listed with: SPAN435.
Credit Only Granted for: SPAN435, SPAN448E, ARTH472 or ARTH369E.
Formerly: SPAN448E and ARTH369E.

ARTH484 Modern Chinese Film and Visual Culture (3 Credits)
Modern Chinese culture, society, and history studied through examples of art, film, and visual culture.Cross-listed with: CINE426.
Credit Only Granted for: ARTH484, CINE426 or FILM426.
Formerly: FILM426.

ARTH485 Chinese Painting (3 Credits)
Chinese painting history from the second century B.C. through the twentieth century, covering cultural, stylistic and theoretical aspects.

ARTH486 Japanese Painting (3 Credits)
Japanese painting from the sixth through the nineteenth century, including Buddhist icon painting, narrative scrolls, and Zen-related ink painting.

ARTH488 Colloquium in Art History (3 Credits)
Colloquium to investigate a specific topic in depth.
Prerequisite: Permission of ARHU-Art History & Archaeology department.
Repeatable to: 9 credits if content differs.

ARTH489 Special Topics in Art History (3 Credits)
Prerequisite: Permission of ARHU-Art History & Archaeology department.
Repeatable to: 9 credits if content differs.

ARTH496 Methods of Art History and Archaeology (3 Credits)
Methods of research and criticism applied to typical art-historical/archaeological problems, familiarizing the student with bibliography and other research tools. Introduction to the historiography of art history and archaeology, surveying the principal theories, encouraging methodological debates within the discipline. Course for majors who intend to go on to graduate school.
Prerequisite: Permission of ARHU-Art History & Archaeology department.
Restriction: Must be in Art History program.

ARTH498 Directed Studies in Art History I (2-3 Credits)
Prerequisite: Permission of ARHU-Art History & Archaeology department.
Restriction: Junior standing or higher.
Repeatable to: 99 credits if content differs.

ARTH499 Honors Thesis (1-6 Credits)
Prerequisite: Permission of ARHU-Art History & Archaeology department.
Repeatable to: 6 credits if content differs.

ARTH608 Studies in Ancient Art and Archaeology (3 Credits)
Repeatable to: 9 credits.

ARTH609 Studies in Late Roman, Early Christian, and Byzantine Art (3 Credits)
Repeatable to: 9 credits.

ARTH618 Studies in Medieval Art (3 Credits)
Repeatable to: 9 credits.

ARTH619 Studies in Italian Renaissance Art (3 Credits)
Repeatable to: 9 credits.

ARTH628 Studies in Fourteenth and Fifteenth Century Northern European Art (3 Credits)
Repeatable to: 9 credits.

ARTH629 Studies in Sixteenth-Century Northern European Art (3 Credits)
Repeatable to: 9 credits.

ARTH638 Studies in Seventeenth-Century Southern European Art (3 Credits)
Repeatable to: 9 credits.

ARTH639 Studies in Seventeenth-Century Northern European Art (3 Credits)
Repeatable to: 9 credits.

ARTH648 Studies in Eighteenth-Century European Art (3 Credits)
Repeatable to: 9 credits.

ARTH649 Studies in Nineteenth-Century European Art (3 Credits)
Repeatable to: 9 credits.

ARTH658 Studies in American Art (3 Credits)
Repeatable to: 9 credits.

ARTH659 Studies in Twentieth-Century Art (3 Credits)
Repeatable to: 9 credits.

ARTH668 Studies in Latin American Art and Archaeology (3 Credits)
Repeatable to: 9 credits.

ARTH669 Studies in African Art (3 Credits)
Repeatable to: 9 credits.

ARTH678 Studies in Chinese Art (3 Credits)
Repeatable to: 9 credits.

ARTH679 Studies in Japanese Art (3 Credits)
Repeatable to: 9 credits.

ARTH689 Selected Topics in Art History (1-3 Credits)
Repeatable to: 9 credits.

ARTH692 Methods of Art History (3 Credits)
Methods of research and criticism applied to typical art-historical problems; bibliography and other research tools.

ARTH699 Special Topics in Art History (3 Credits)
Prerequisite: consent of department head or instructor.
Restriction: Permission of instructor; or permission of ARHU-Art History & Archaeology department.

ARTH708 Seminar in Ancient Art and Archaeology (3 Credits)
Repeatable to: 9 credits.

ARTH709 Seminar in Late Roman, Early Christian, and Byzantine Art (3 Credits)
Repeatable to: 9 credits.

ARTH718 Seminar in Medieval Art (3 Credits)
Repeatable to: 9 credits.

ARTH719 Seminar in Italian Renaissance Art (3 Credits)
Repeatable to: 9 credits.

ARTH728 Seminar in Fourteenth and Fifteenth-Century Northern European Art (3 Credits)
Repeatable to: 9 credits.

ARTH729 Seminar in Sixteenth-Century Northern European Art (3 Credits)
Repeatable to: 9 credits.

ARTH738 Seminar in Seventeenth-Century Southern European Art (3 Credits)
Repeatable to: 9 credits.

ARTH739 Seminar in Seventeenth-Century Northern European Art (3 Credits)
Repeatable to: 9 credits.

ARTH748 Seminar in Eighteenth-Century European Art (3 Credits)
Repeatable to: 9 credits.

ARTH749 Seminar in Nineteenth-Century European Art (3 Credits)
Repeatable to: 9 credits.

ARTH758 Seminar in American Art (3 Credits)
Repeatable to: 9 credits.

ARTH759 Seminar in Twentieth-Century Art (3 Credits)
Repeatable to: 9 credits.

ARTH768 Seminar in Latin American Art and Archaeology (3 Credits)
Repeatable to: 9 credits.

ARTH769 Seminar in African Art (3 Credits)
Repeatable to: 9 credits.

ARTH778 Seminar in Chinese Art (3 Credits)
Repeatable to: 9 credits.

ARTH779 Seminar in Japanese Art (3 Credits)
Repeatable to: 9 credits.

ARTH789 Selected Topics in Art History (1-3 Credits)

ARTH798 Directed Graduate Studies in Art History (3 Credits)

ARTH799 Master's Thesis Research (1-6 Credits)

ARTH898 Pre-Candidacy Research (1-8 Credits)

ARTH899 Doctoral Dissertation Research (1-8 Credits)

ARTT - Art Studio

ARTT409 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

ARTT418 Advanced Drawing Studio (3 Credits)
Multi-level drawing studio emphasizing advanced concepts and processes related to drawing; emphasis on contemporary art issues and individual directions.
Prerequisite: ARTT200, ARTT210, and ARTT150; and must have completed one 300-level studio course. Or permission of ARHU-Art department.
Repeatable to: 12 credits.

ARTT428 Advanced Painting Studio (3 Credits)
Multi-level painting studio emphasizing advanced concepts and processes related to oil and acrylic painting; emphasis on contemporary art issues and individual directions in chosen media.
Prerequisite: ARTT320.
Repeatable to: 12 credits.

ARTT438 Advanced Sculpture Studio (3 Credits)
Multi-level sculpture studio; continuation of media-specific sculpture courses with emphasis on contemporary art issues and individual directions in chosen media.
Prerequisite: Must have completed one 300-level sculpture course; or permission of ARHU-Art department.
Repeatable to: 12 credits.

ARTT448 Advanced Printmaking Studio (3 Credits)
Multi-level printmaking studio; continuation of media-specific printmaking courses with emphasis on contemporary art issues and individual directions in chosen media.
Prerequisite: Must have one 300-level printmaking course; or permission of ARHU-Art department.
Repeatable to: 12 credits.

ARTT449 Advanced Photography Studio (3 Credits)
Advanced photographic processes and theory. Emphasis on contemporary art issues and individual directions.
Prerequisite: ARTT353; or permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT454 Advanced Graphic Design Principles: Design in Society (3 Credits)
Focus on social responsibility and community activism. History and theory of propaganda and advocacy-based design. Students explore current design practices, work individually, and collaborate in teams with non-profits or other clients with community-based or socio-cultural agendas. Research and writing-intensive course.
Prerequisite: ARTT355 and ARTT356.

ARTT455 Three Dimensional Graphic Design (3 Credits)
Continued exploration of advanced graphic design practices with primary emphasis on 3-D object and packaging design. Includes research, course reading discussion, oral presentations, and specific project assignments which will require a proficient level of hand-skills (craft) and computer skills.
Prerequisite: ARTT355, ARTT356, and ARTT357.
Recommended: ARTT333.
Credit Only Granted for: ARTT352 or ARTT455.
Formerly: ARTT352.

ARTT456 Motion Design (3 Credits)
Explores computer graphics and visual communication principles in a time-based context. Examination of fundamental design principles through digital projects that involve photo manipulation, digital illustration, layout, animation, and web design.
Prerequisite: ARTT355, ARTT356, and ARTT357; or permission of ARHU-Art department.

ARTT457 Advanced Interactive Design (3 Credits)
Advanced concepts and techniques of interactive design and interactive software. Examination of corporate, client-based, and public service-based interactive graphic design. Emphasis on web-based interactive design structures.
Prerequisite: ARTT357.

ARTT458 Graphic Design Portfolio (3 Credits)
Creation of a comprehensive professional portfolio. Curriculum includes portfolio preparation and presentation, contracts, copyright issues, interviewing skills, resume and cover-letter writing, design briefs and proposals, and freelance business issues. Portfolio presentation includes basics of book arts.
Prerequisite: ARTT454.
Repeatable to: 9 credits if content differs.

ARTT459 Advanced Graphic Design Studio (3 Credits)
Student-run design firm working with non-profits and other organizations. Organizations act as clients; the students as a creative firm. Under guidance and supervision of faculty, students learn first-hand about working with clients, working within a budget, working with printers and press runs, and working under real deadlines.
Prerequisite: ARTT454; or permission of ARHU-Art department.
Repeatable to: 9 credits if content differs.

ARTT460 Seminar in Art Theory (3 Credits)
Exploration of relationship between content and processes of art in a contemporary multi-cultural context.
Restriction: Senior standing.

ARTT468 Seminar on the Interrelationship Between Art and Art Theory (3 Credits)
The relationship between a student's work and the theoretical context of contemporary art.
Restriction: Junior standing or higher; or permission of ARHU-Art department.
Repeatable to: 6 credits if content differs.

ARTT469 Professional Practice (3 Credits)
Business aspects of being an artist, with an emphasis on starting and maintaining a professional career.
Restriction: Senior standing; or permission of ARHU-Art department.
Repeatable to: 6 credits if content differs.
Formerly: ARTT462.

ARTT479 Advanced Digital Media Studio (3 Credits)
Variable multi-level studio emphasizing advanced concepts and processes related to time-based, projection, installation, interactive, and audio/visual integrated digital art. Emphasis on contemporary art issues and individual directions.
Prerequisite: ARTT370; or permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT481 Advanced Specialization Seminar (3 Credits)
Seminar combines contemporary art theory, criticism, professional practice and career preparation in relation to students works from all areas of specialization.
Prerequisite: Permission of ARHU-Art department.

ARTT487 Capstone for Citation in Interdisciplinary Multimedia and Technology (1 Credit)
Independent study: a paper or website synthesizing the various citation learning experiences.
Prerequisite: Permission of ARHU-Art department.

ARTT488 Advanced Special Topics in Graphic Design (1-3 Credits)
Variable topics in Graphic Design theory and practice.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 6 credits if content differs.

ARTT489 Advanced Special Topics in Art (1-3 Credits)
Advanced studio art and theory within the context of a special topic.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT498 Directed Studies in Studio Art (1-3 Credits)
Advanced independent work in Studio Art. Meeting with faculty and studio time arranged.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT499 Directed Studies in Graphic Design (1-3 Credits)
Advanced independent studies in Graphic Design. Meetings with faculty and studio time arranged.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT618 Drawing (3 Credits)
Independent studies in drawing for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT628 Painting (3 Credits)
Graduate painting for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT638 Sculpture (3 Credits)
Independent studies in sculpture for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT648 Printmaking (3 Credits)
Independent studies in printmaking for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT689 Special Problems in Studio Art (3 Credits)
Restriction: Permission of instructor.
Repeatable to: 6 credits.
Formerly: ARTS689.

ARTT698 Directed Graduate Studies in Studio Art (1-4 Credits)
Independent work. Meetings with faculty and studio time arranged.
Prerequisite: Permission of ARHU-Art department.
Restriction: Must be in Studio Art (Master's) program.
Repeatable to: 12 credits if content differs.
Formerly: ARTS698.

ARTT699 Directed Graduate Studies in Studio Art (1-4 Credits)
Independent graduate studies.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits.

ARTT718 Drawing (3 Credits)
Independent studies in drawing for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT728 Painting (3 Credits)
Independent studies in painting for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT738 Sculpture (3 Credits)
Independent studies in sculpture for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT748 Printmaking (3 Credits)
Independent studies in printmaking for advanced special students.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT768 Graduate Colloquium (2 Credits)
Examines various aspects of art, art theory and criticism in a contemporary and multi-cultural context. Relates student work to this context.
Prerequisite: Permission of ARHU-Art department.
Repeatable to: 12 credits if content differs.

ARTT798 Directed Graduate Studies in Studio Art (1-4 Credits)
Independent graduate studies.
Restriction: Must be in Studio Art (Master's) program.
Repeatable to: 12 credits if content differs.
Formerly: ARTS798.

ARTT799 Master's Thesis Research (1-6 Credits)
Formerly: ARTS799.

ASTR - Astronomy

ASTR406 Stellar Structure and Evolution (3 Credits)
Study of stellar internal structure, nuclear reactions, and energy transport. Study of stellar evolution of both low-mass and high-mass stars, including the stellar end states of white dwarfs, neutron stars, and black holes.
Prerequisite: ASTR320; or permission of CMNS-Astronomy department.
Credit Only Granted for: ASTR 498N or ASTR 406.
Formerly: ASTR 498N.

ASTR410 Radio Astronomy (3 Credits)
Introduction to current observational techniques in radio astronomy. The radio sky, radiophysics, coordinates and catalogs, antenna theory, Fourier transforms, interferometry and arrays, aperture synthesis, and radio detectors.
Prerequisite: ASTR121; and (PHYS271 and PHYS270; or PHYS273). Or permission of CMNS-Astronomy department.

ASTR415 Computational Astrophysics (3 Credits)
Introduction to the most important computational techniques being used in research in astrophysics. Topics include modern high performance computer architectures, scientific visualization and data analysis, and detailed descriptions of numerical algorithms for the solution to a wide range of mathematical systems important in astrophysics.
Prerequisite: ASTR121; and (PHYS271 and PHYS270; or PHYS273). Or permission of CMNS-Astronomy department. Jointly offered with ASTR615.
Credit Only Granted for: ASTR415 or ASTR615.

ASTR421 Galaxies (3 Credits)
Introduction to structure, kinematics, and dynamics of normal and peculiar galaxies. Quantitative descriptions of normal spiral galaxies (like our Milky Way) and elliptical galaxies will be followed by more exotic considerations such as interacting and merging galaxies, and active galactic nuclei.
Prerequisite: ASTR121; and (PHYS271 and PHYS270; or PHYS273). Or permission of CMNS-Astronomy department.

ASTR422 Cosmology (3 Credits)
Introduction to modern cosmology. Topics include large scale structure of universe, the intergalactic medium, the nature of dark matter cosmological models and galaxy formation.
Prerequisite: Must have completed or be concurrently enrolled in ASTR320; or permission of CMNS-Astronomy department.

ASTR430 The Solar System (3 Credits)
Formation and evolution of the Solar System. Planetary surfaces, interiors, atmospheres, and magnetospheres. Asteroids, comets, planetary satellites, and ring systems. Emphasis on using basic physics to understand observed properties of the Solar System. Intended for students majoring in the physical sciences.
Prerequisite: ASTR121; and (PHYS271 and PHYS270; or PHYS273). Or permission of CMNS-Astronomy department.

ASTR435 Astrophysics of Exoplanets (3 Credits)
Introduction to exoplanets. Topics include historical development, advantages, and limitations of detection methods, the statistics of exoplanet characteristics, the bulk properties of known expolanets, and remote sensing for characterization of exoplanets.
Prerequisite: ASTR121; and (PHYS273; or (PHYS270 and PHYS271)). Or permission of CMNS-Astronomy department.
Credit Only Granted for: ASTR 498X or ASTR 435.
Formerly: ASTR 498X.

ASTR450 Orbital Dynamics (3 Credits)
Vectorial mechanics, motion in a central force field, gravitational and non-gravitational forces, the two-body and three-body problems, orbital elements and orbital perturbation theory, resonances in the solar system, chaos. Intended for students majoring in any of the physical sciences.
Prerequisite: Must have completed or be concurrently enrolled in ASTR320; or permission of CMNS-Astronomy department.

ASTR480 High Energy Astrophysics (3 Credits)
The structure, formation, and astrophysics of compact objects, such as white dwarfs, neutron stars, and black holes, are examined. Phenomena such as supernovae and high-energy particles are also covered.
Prerequisite: Must have completed or be concurrently enrolled in ASTR320; or permission of CMNS-Astronomy department.

ASTR498 Special Problems in Astronomy (1-6 Credits)
Research or special study. Credit according to work done.
Restriction: Must be in one of the following programs (Physics; Astronomy) ; and permission of CMNS-Astronomy department.

ASTR601 Radiative Processes (3 Credits)
Emission, absorption, and scattering of radiation by matter, with astrophysical applications. Thermodynamics and statistical mechanics: LTE, Boltzmann, and Saha equations; radiative transfer; atomic and molecular radiation; plasma radiation and transfer: bremsstrahlung, synchrotron emission, Compton scattering.
Restriction: Permission of CMNS-Astronomy department.

ASTR606 Stellar Structure and Evolution (3 Credits)
Models of stellar atmospheres, methods of determinins properties of stars, physical principles governing stellar interior processes, observational data for determining stellar evolution, nuclear processes, stellar modeling.
Prerequisite: ASTR601; or permission of CMNS-Astronomy department.

ASTR610 Astronomical Instrumentation and Techniques (3 Credits)
Review of Maxwell's equations; designs of telescopes, spectrographs, modern detectors; basic concepts for radio detectors and telescopes; interferometry and data processing.
Restriction: Permission of CMNS-Astronomy department.

ASTR615 Computational Astrophysics (3 Credits)
Introduction to computational techniques used in astrophysical research. Topics include modern high performance computer architectures, scientific visualization and data analysis, and detailed descriptions of numerical algorithms for the solution to a wide range of mathematical systems important in astrophysics.
Restriction: Permission of CMNS-Astronomy department. Jointly offered w ith ASTR415.
Credit Only Granted for: ASTR415 and ASTR615.

ASTR620 Galaxies (3 Credits)
Galaxy classifications; Milky way: basic data, distribution of stars, gas, dust and relativistic particles, large-scale structure and rotation; Spiral galaxies: stellar dynamics and stability, density waves, star bursts, galactic center; Elliptical galaxies: stellar dynamics, cannabalism; galaxy formation.
Restriction: Permission of CMNS-Astronomy department.

ASTR622 Cosmology (3 Credits)
Introduction to modern cosmology. Topics include the large scale structure of the universe, cosmological models, the Big Bang, the cosmic microwave background, the nature of dark matter, and galaxy formation.
Restriction: Permission of CMNS-Astronomy department.
Credit Only Granted for: ASTR622 or ASTR688R.
Formerly: ASTR688R.

ASTR630 Planetary Science (3 Credits)
The science of our planetary system with an emphasis on the aspects of it, that help us understand the origin of the system and thus the relevance to other planetary systems. Topics will include planetary atmospheres, surfaces, and interiors and the small bodies of the solar system (asteroids, comets, Kuiper-belt objects). We will consider the dynamics of these bodies and the physics and chemistry of these bodies.
Restriction: Permission of CMNS-Astronomy department.
Credit Only Granted for: ASTR630 or ASTR688P.
Formerly: ASTR688P.

ASTR670 Interstellar Medium and Gas Dynamics (3 Credits)
Content of phases of the interstellar medium: physical processes in the ISM: ionization equilibrium, heating and cooling, interstellar dust; gas dynamics: fluid motions, instabilities, shock waves; magnetohydrodynamics.
Prerequisite: ASTR601; or permission of CMNS-Astronomy department.

ASTR680 High Energy Astrophysics (3 Credits)
The structure, formation, and astrophysics of compact objects, such as white dwarfs, neutron stars, and black holes, are examined.
Restriction: Permission of CMNS-Astronomy department.
Formerly: ASTR688M.

ASTR688 Special Topics in Modern Astronomy (1-3 Credits)
Special topics such as extragalactic radio sources, plasma astrophysics, the H.R. diagram, chemistry of the interstellar medium, radiophysics of the sun.
Restriction: Permission of instructor.

ASTR690 Reasearch Project I (3 Credits)

ASTR695 Introduction to Research (1 Credit)
Provides an introduction to research programs in the Department of Astronomy and a forum to explore possible research projects. Aimed at incoming graduate students.

ASTR699 Special Problems in Advanced Astronomy (1-6 Credits)

ASTR788 Selected Topics in Modern Astronomy (1-3 Credits)

ASTR799 Master's Thesis Research (1-6 Credits)

ASTR898 Pre-Candidacy Research (1-8 Credits)

ASTR899 Doctoral Dissertation Research (1-8 Credits)

BCHM - Biochemistry

BCHM461 Biochemistry I (3 Credits)
First semester of a comprehensive introduction to modern biochemistry. Structure, chemical properties, and function of proteins and enzymes, carbohydrates, lipids, and nucleic acids. Basic enzyme kinetics and catalytic mechanisms.
Prerequisite: Minimum grade of C- in CHEM271 and CHEM272; or minimum grade of C- in CHEM276 and CHEM277.
Credit Only Granted for: BCHM461 or BCHM463.

BCHM462 Biochemistry II (3 Credits)
A continuation of BCHM 461. Metabolic pathways and metabolic regulation, energy transduction in biological systems, enzyme catalytic mechanisms.
Prerequisite: Minimum grade of C- in BCHM461.
Credit Only Granted for: BCHM462 or BCHM463.

BCHM463 Biochemistry of Physiology (3 Credits)
A one-semester introduction to general biochemistry. A study of protein structure, enzyme catalysis, metabolism, and metabolic regulation with respect to their relationship to physiology.
Prerequisite: Minimum grade of C- in CHEM271 and CHEM272; or minimum grade of C- in CHEM276 and CHEM277.
Credit Only Granted for: BCHM461, BCHM462 or BCHM463.

BCHM464 Biochemistry Laboratory (3 Credits)
Biochemical and genetic methods for studying protein function. Site-directed mutagenesis and molecular cloning, protein purification, enzyme activity assays, computer modeling of protein structure.
Prerequisite: BCHM461 or BCHM463; and a grade of C- or better in the prerequisite is required for all College of Computer, Mathematical, and Natural Sciences majors and recommended for all students.
Corequisite: BCHM465.
Restriction: BCHM, CHEM, and Nutritional Sciences majors have first priority, followed by other life science majors.

BCHM465 Biochemistry III (3 Credits)
CORE Capstone (CS) Course. An advanced course in biochemistry. Biochemical approach to cellular information processing. DNA and RNA structure. DNA replication, transcription, and repair. Translation of mRNA to make proteins.
Prerequisite: BCHM461 or BCHM463; and a grade of C- or better in the prerequisite is required for College of Computer, Mathematical, and Natural Sciences majors and recommended for all students.
Recommended: BCHM462.

BCHM485 Physical Biochemistry (3 Credits)
Physical Chemistry with applications to biological systems. Principal topics: quantum chemistry, spectroscopy, structural methods for biological macromolecules, statistical thermodynamics, transport processes in liquid phase, chemical and biochemical kinetics, modeling and simulation, polymer dynamics.
Prerequisite: Minimum grade of C- in CHEM481.
Restriction: Must be in Biochemistry program; or permission of instructor.
Credit Only Granted for: CHEM482 or BCHM485.

BCHM661 Nucleic Acids I (2 Credits)
Topics covered: Chemistry and structure of DNA and RNA, from nucleotides to chromatin, chromosomes, and genomes, and some methods for studying, synthesizing, sequencing and manipulating nucleic acids. Rudimentary genomics and bioinformatics. DNA Biology: selected aspects of the biochemistry and regulation of DNA replication, repair, and recombination, and how these processes interact with each other.
Prerequisite: BSCI410 and BCHM465.

BCHM662 Nucleic Acids II (2 Credits)
Topics covered: Interactions between nucleic acids and ligands such as cations, drugs, and especially proteins. Sources of binding affinity and specificity. Selection-amplification methods. Description of several classes of protein-nucleic acids complexes. DNA/RNA catalysis, the origin of life, mobile genetic elements.
Prerequisite: BCHM661.

BCHM668 Special Problems in Biochemistry (2-4 Credits)
Prerequisite: BCHM464; or students who have taken courses with comparable content may contact the department.

BCHM669 Special Topics in Biochemistry (1-3 Credits)
Prerequisite: BCHM462; or students who have taken courses with comparable content may contact the department.

BCHM671 Protein Chemistry and Enzymic Catalysis (3 Credits)
Principles of protein structure, folding, and function, experimental characterization of structure, active sites, enzyme mechanisms and kinetics.
Prerequisite: BCHM461; or students who have taken courses with comparable content may contact the department.

BCHM675 Biophysical Chemistry (3 Credits)
Conformation, shape, structure, conformational changes, dynamics and interactions of biological macromolecules and complexes or arrays of macromolecules. Physical techniques for studying properties of biological macromolecules.
Prerequisite: CHEM481 and BCHM461; or students who have taken courses with comparable content may contact the department.

BCHM676 Biological Mass Spectrometry (3 Credits)
Fundamentals of modern mass spectrometry and use with biochemical techniques to provide unique analyses of drug metabolites, lipids, carbohydrates, nucleotides and proteins. The interface with bioinformatics will be examined, which provides the foundation of proteomics.
Prerequisite: BCHM461 or BCHM463.
Formerly: BCHM669B.

BCHM677 Computational Tools in Biochemistry (1 Credit)
A practical, hands-on introduction to the application of computational tools that support biochemistry research. Selected topics may include: efficient use of scientific literature databases and the preparation of professional bibliographies; proteomics and mass spectrometry; bioinformatics and genomics programs an database resources; molecular structure visualization and modeling; quatitative data fitting and error analysis; and laboratory research ethics.
Prerequisite: BCHM674 or BCHM671; or permission of instructor.
Restriction: Must be in one of the following programs (Biochemistry (Master's); Biochemistry (Doctoral)) ; or permission of instructor.

BCHM698 Literature Seminar in Biochemistry (2 Credits)
Students will prepare and present a departmental seminar based on a topic in the current biochemical research literature.
Repeatable to: 2 credits if content differs.

BCHM699 Special Problems in Biochemistry (1-6 Credits)
Laboratory experience in a research environment. Restricted to students in the non-thesis M.S. option.
Prerequisite: Must have completed one semester of graduate study in biochemistry; and must be in the Biochemistry Masters program non-thesis M.S. option.
Repeatable to: 6 credits if content differs.

BCHM799 Master's Thesis Research (1-6 Credits)

BCHM889 Seminar (1-3 Credits)

BCHM898 Pre-Candidacy Research (1-8 Credits)

BCHM899 Doctoral Dissertation Research (1-8 Credits)

BEES - Behavior, Ecology, Evolution and Systematics

BEES608 Seminar in Behavior, Ecology, Evolution and Systematics (1-4 Credits)
One seminar per week for each subject selected: Behavior; Ecology; Evolution; Systematics; Behavior, Ecology, Evoultion and Systematics.
Repeatable to: 15 credits if content differs.

BEES609 Special Topics in Behavior, Ecology, Evolution and Systematics (1-6 Credits)
Lectures, experimental courses and other special instructions in topics appropriate for Behavior, Ecology, Evolution and Systematics (BEES) students.
Repeatable to: 12 credits if content differs.

BEES708 Advanced Topics in Behavior, Ecology, Evolution, and Systematics (1-4 Credits)
Lectures, experimental courses, and other special instruction in various behavioral, ecology, evolution and systematics subjects.
Repeatable to: 12 credits if content differs.

BEES799 Master's Thesis Research (1-6 Credits)

BEES898 Pre-Candidacy Research (1-8 Credits)

BEES899 Doctoral Dissertation Research (1-8 Credits)

BERC - Center for Study of Business, Ethics, Regulation, Crime

BERC600 Legal and Regulatory Compliance (3 Credits)
Global anticorruption law (including the Foreign Corrupt Practices Act, the UK Bribery Act, the OECDs Convention on Combating Bribery of Foreign Public Officials in International Business Transactions, Canadas Corruption of Public Officials Act, and the Inter American Convention Against Corruption). Sarbanes Oxley compliance (including certification requirements, whistleblower protection, and audit committees). Financial integrity (including money laundering, insider trading, market manipulation, conflicts of interest, and privacy). Internal investigations or attorney client privilege. Compliance (antitrust, food and drug, environmental, occupational safety and health).

BERC601 White-Collar Crime and Victimization (3 Credits)
History, definitions, categories and trends of white collar crime, within the US and globally. The corporation as offender and the corporation as victim; Data sources and measurement; Theories of offending and victimization; Costs of crime, correlates of crime, and risks; Internal compliance systems; Enforcement strategies (deterrence/compliance); responsive regulation; enforcement pyramid; Policy assessment.

BERC602 Accounting and Its Uses in the Forensic Process (3 Credits)
An introduction to accounting for the uninitiated (an introduction to bookkeeping, key accounts, financial statements and their composition, and concepts in managerial accounting). Principles of forensic accounting and the use of financial statement analysis in the forensic process (common fraud schemes in the areas of fraudulent financial reporting, misappropriation of resources, corruption and illegal acts, how fraud schemes typically appear in the accounting records and financial statements of an enterprise or agency, the use of financial statement analysis and analytics to detect fraud, differences between a routine financial statement audit and a forensic audit, the limitations on financial statement audits in the discovery of fraud, how budgeting issues in managerial accounting can pressure managers to act unethically or illegally).

BERC603 Investigative tools and Data Analysis (3 Credits)
Techniques to electronically capture and integrate data from a variety of different sources aimed to assist managerial decision-making in such areas as fraud detection. Focus on large data sets for data mining/machine learning tools for classifications (such as decision trees, neural networks, techniques to recognize patterns in the data and regression modeling and statistics to aid prediction). Learning and utilizing appropriate software (e.g., XLMiner). Computer-aided analysis techniques for detecting and investigating white-collar offenses, issues related to the collective use of digital evidence and the collection of data from electronic devices. Extensive use of case studies as examples.

BIOE - Bioengineering

BIOE404 Biomechanics (3 Credits)
Introduction to the fundamentals of biomechanics including force analysis, mechanics of deformable bodies, stress and strain, multiaxial deformations, stress analysis, and viscoelasticity. Biomechanics of soft and hard tissues.
Prerequisite: MATH246, BIOE120, ENES102, BIOE121, and BIOE241; and must have completed or be concurrently enrolled in BIOE371.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE411 Tissue Engineering (3 Credits)
A review of the fundamental principles involved in the design of engineered tissues and organs. Both biological and engineering fundamentals will be considered.
Prerequisite: Must have completed at least one biology course; and (BIOE120, BIOE121, BIOE241, MATH246, and MATH241). Or permission of ENGR-Fischell Department of Bioengineering department.
Recommended: BSCI330 and BIOE340.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE411 or CHBE487.

BIOE413 Stem Cell Engineering (3 Credits)
Provides an introduction to the role of stem cells in tissue growth and development, the engineering of stem cells and their environments for regenerative medicine applications, and disease modeling. Topics covered will include basic stem cell biology and mechanobiology; experimental methods for growing, differentiating, studying, and characterizing stem cells; stem cell integration into engineered microenvironments (e.g., tissue scaffolds and biomaterials, organ-on-chip devices, 3D-printed biomaterials); stem cell engineering in clinical applications and disease models; and ethical, commercialization, and regulatory issues in the field of stem cell engineering.
Prerequisite: BIOE241, BIOE120, BIOE121, MATH246, and BIOE340.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department. Jointly offered with: BIOE613.
Credit Only Granted for: BIOE489J, BIOE413, BIOE689J or BIOE613.
Formerly: BIOE489J.

BIOE414 Macroscale Biomechanics (3 Credits)
An overview of current problems in movement biomechanics. After taking this course, students will be able to 1) Describe the engineering tools needed to study human movement 2) Recognize a variety of clinical research and practice, and 3) Use the framework provided by the course to pursue their own self-teaching and research on these topics. Topics covered include muscle mechanics, joint mechanics, EMG and EEG signal applications, ultrasonography and elastography, anthropometry, human movement 3-D kinematics, inverse dynamics, forward dynamics, work, power and energy. Biomechanics tools will be used to investigate clinical problems. Students will also do research projects on related topics.
Prerequisite: BIOE120, BIOE121, BIOE241, MATH246, and ENES102.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE414 or BIOE489Z.
Formerly: BIOE489Z.

BIOE416 Cardiovascular Engineering (3 Credits)
An overview of engineering applications in the cardiovascular system. Covers cardiovascular anatomy, physiology and pathophysiology in the context of cell and tissue mechanics, fluid mechanics, thermodynamics, biotransport, neurovascular coupling, and imaging. Includes design of cardiovascular devices, sensors, biomaterials, and tissue engineered constructs.
Prerequisite: BIOE331 and BIOE340.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE416 or BIOE489V.
Formerly: BIOE489V.

BIOE420 Bioimaging (3 Credits)
Examines the physical principles behind major biomedical imaging modalities and new ways of using images for bio-related applications.
Prerequisite: MATH246, BIOE120, BIOE121, and BIOE241.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE431 Fundamentals of Biosensor Techniques, Instrumentation, and Applications (3 Credits)
A thorough review of fundamental concepts of biosensing systems, principles of common detection methods, and modern applications of biosensors. Primarily literature driven. Students will obtain a detailed understanding of cutting-edge biosensing techniques, the instrumentation used, and the application space. Students also will develop skills in using current literature as a source of knowledge.
Prerequisite: CHEM135, PHYS260, PHYS261, BSCI330, BIOE120, BIOE121, BIOE241, and MATH246; or permission of ENGR-Fischell Department of Bioengineering department.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE433 Optical Microscopy (3 Credits)
Includes a large variety of techniques central in many fields of biological and engineering research as well as clinical medicine. This course will provide a comprehensive overview of the fundamentals of optical microscopy. At a fundamental level, the course will cover the interaction of light with tissue, cells and biomaterials, and the mathematical foundations that describe optical systems.
Prerequisite: BIOE120, BIOE121, BIOE241, BIOE371, and MATH246.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE489I or BIOE433.
Formerly: BIOE489I.

BIOE434 Image Signal Processing (3 Credits)
An introduction to fundamentals of signal and image processing, including machine learning, and their applications in biomedicine. Students will be introduced to the basic set of skills to analyze biomedical signals and images and convert them into useful diagnostic information. Students will also explore current research in the area of biomedical signal imaging and discuss how those technologies help to improve the efficiency, accuracy, and patient experience of conventional medical and diagnosis procedures.
Prerequisite: BIOE241, BIOE371, and BIOE372; or permission of ENGR-Fischell Department of Bioengineering department.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE434 or BIOE489K.
Formerly: BIOE489K.

BIOE437 Computer-Aided Design in Bioengineering (3 Credits)
Introduction to Computer-Aided Design (CAD). Basic CAD operations will be demonstrated in class with Creo Parametric (formerly Pro/E). Lecture topics will summarize design methodology, review best-practices in hardware development, and discuss engineering applications. The course will culminate in a student-selected project leveraging CAD.
Prerequisite: BIOE120, BIOE121, BIOE241, and MATH246; or permission of ENGR-Fischell Department of Bioengineering department.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE437, BIOE689V, ENME414, ENME272, or ENAE488D.
Formerly: BIOE689V.

BIOE442 Python: Introduction to Programming and Data Analysis (3 Credits)
Provides an introduction to structured programming, computational methods, and data analysis techniques with the goal of building a foundation allowing students to confidently address problems in research and industry. Fundamentals of programming, algorithms, and simulation are covered from a general computer science perspective, while the applied data analysis and visualization portion makes use of the Python SciPy stack.
Prerequisite: BIOE241, BIOE120, BIOE121, and MATH241; or permission of ENGR-Fischell Department of Bioengineering department.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE489A or BIOE442.
Formerly: BIOE489A.

BIOE447 Clinical Experiences in Bioengineering (3 Credits)
An immersion experience in the clinical settings in which biomedical engineering strategies, technologies, and practices are applied. An emphasis will be placed on both clinical problems and engineering solutions.
Prerequisite: BIOE221.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE489O or BIOE447.
Formerly: BIOE489O.

BIOE453 Biomaterials (3 Credits)
Examination of the structure and function of natural biomaterials, and cell-extracellular matrix interactions. Study physical properties of synthetic biomaterials for biomedical applications. Understanding molecular level interactions between biomolecules and biomaterials to design novel biomaterials with desirable characteristics. Application of biomaterials as implants, drug delivery systems, biosensors, engineered materials such as artificial skin and bone growth scaffolds will be covered.
Prerequisite: CHEM231, MATH246, CHEM232, BIOE120, BIOE121, and BIOE241.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE453, CHBE457, or ENMA425.

BIOE457 Biomedical Electronics & Instrumentation (4 Credits)
Students learn fundamental concepts of electronics, assembly of electronic components into functional circuits, and integration of functional electronic devices and circuits into a system. In the lab component, students will learn to assemble and evaluate circuits and systems.
Prerequisite: BIOE120, BIOE121, BIOE241, PHYS261, MATH246, and PHYS260.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE460 Biotechnology and Bioproduction (3 Credits)
Basics of recombinant DNA technology and biopharmaceutical manufacturing.
Restriction: Junior standing or higher.
Credit Only Granted for: BIOE460, BIOE468B, or ENES489Q.
Formerly: BIOE468B.

BIOE461 Synthetic Biology and Biological Engineering (3 Credits)
Students are introduce to the scientific foundation and concepts of synthetic biology and biological engineering. Current examples that apply synthetic biology to fundamental and practical challenges will be emphasized. The course will also address the societal issues of synthetic biology, and briefly examine interests to regulate research in this area.
Prerequisite: BIOE120, BIOE121, BIOE241, and MATH246; or permission of ENGR-Fischell Department of Bioengineering department.
Recommended: Completion of BSCI222 and/or BSCI330 recommended.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE462 Therapeutic Development and Delivery (3 Credits)
The ultimate purpose of the pharmaceutical and biotechnology industries is the development and delivery of therapeutics. This course covers fundamentals of engineering and the pharmaceutical sciences related to therapeutics, including basic pharmaceutics/drug delivery, pharmacokinetics, biomolecular kinetics, and regulatory issues. Specific focus is placed on biotherapeutics, including antibodies and protein engineering,RNA and DNA therapeutics (gene therapy and RNAi), extracellular vesicle biotechnology (exosomes), and cell-based therapies, including stem cells. The use of delivery technologies to enable therapeutics (e.g. nanomedicine) will also be discussed.
Prerequisite: BIOE120, BIOE121, BIOE241, MATH246, and BSCI330; and must have completed or be concurrently enrolled in BIOE340.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE489P or BIOE462.
Formerly: BIOE489P.

BIOE463 Spatial Control of Biological Agents (3 Credits)
Description and solution of the movement of passive and active biological agents in homogeneous and heterogeneous bioenvironments using partial differential equations and numerical methods. Identification and diagnosis of hot spots. Prescription of control strategies using techniques from Artificial Intelligence (AI) and verification of effectiveness. Applications environments may include landscapes and tissues.
Prerequisite: BIOE120, BIOE121, BIOE241, and MATH246; and must have completed or be concurrently enrolled in BIOE332.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE464 Introduction to Computational Molecular Bioengineering (3 Credits)
Designed to introduce students to the principles, methods, and software used for simulation and modeling of macromolecules of biological interest such as proteins, lipids, and polysaccharides. Along with experiment and theory, computational modeling provides new tools for analysis, explanation and prediction. The course is also useful for students who plan to use experimental techniques as their primary approach, but who will employ computational modeling as a tool to obtain integrative understanding of complex systems. Finally, the course should be valuable as an introductory overview for students planning to conduct their thesis research in computational modeling of biological systems. Class topics: Basic statistical thermodynamics, Force fields, Molecular dynamics/ monte carlo methods, Conformational analysis, Fluctuations & transport properties, Free-energy calculations, Multiscale modeling.
Prerequisite: BIOE120, BIOE241, MATH246, BIOE232, and BIOE372; or permission of ENGR-Fischell Department of Bioengineering department.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE489N or BIOE464.
Formerly: BIOE489N.

BIOE468 Selected Topics in Bioengineering (3 Credits)
Selected topics in Bioengineering will be covered and taught by a variety of department faculty.
Prerequisite: BIOE120 and BIOE121.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Repeatable to: 9 credits if content differs.

BIOE485 Capstone Design I: Entrepreneurship, Regulatory Issues, and Ethics (3 Credits)
This is the first part of a two-semester senior capstone design course which covers principles involved in engineering design, design approaches, economics of design, ethics in engineering, and patent regulations. It also helps students learn team work and write design project proposals under the mentorship of a faculty advisor.
Prerequisite: 21 credits in BIOE courses.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department; and senior standing; and must be in Engineering: Bioengineering program.
Credit Only Granted for: BIOE485 or ENBE485.
Formerly: ENBE485.

BIOE486 Capstone Design II (3 Credits)
This is the second part of the senior capstone design course. This part is independent instruction where faculty mentoring each project team works with students to order supplies, fabricate their proposed design under BIOE485, test the design, write the report and present it to their fellow seniors and board of faculty mentors. Students are taught to convert the blue print of a design to actual device and test it.
Prerequisite: Must have completed BIOE485 in the immediately preceding semester.
Restriction: Senior standing; and must be in Engineering: Bioengineering program; and permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE486 or ENBE486.
Formerly: ENBE486.

BIOE489 Special Topics in Bioengineering (1-3 Credits)
Exploring a variety of topics with Bioengineering.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Repeatable to: 6 credits.

BIOE601 Biomolecular and Cellular Rate Processes (3 Credits)
Presentation of techniques for characterizing and manipulating non-linear biochemical reaction networks. Advanced topics to include mathematical modeling of the dynamics of biological systems; separation techniques for heat sensitive biologically active materials; and rate processes in cellular and biomolecular systems. Methods are applied to current biotechnological systems, some include: recombinant bacteria; plant insect and mammalian cells; and transformed cell lines.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE601 or ENCH859B.

BIOE602 Cellular and Tissue Biomechanics (3 Credits)
Introduction to the fundamentals of biomechanics including force analysis, mechanics of deformable bodies, stress and strain, multiaxial deformations, stress analysis, and viscoelasticity. Biomechanics of soft and hard tissues.

BIOE604 Cellular and Physiological Transport Phenomena (3 Credits)
A study of transport processes, including momentum, energy and mass transport, relevant to biosystems at various scales from physiological to cellular systems. Transport leads to sets of partial differential equations and the course revolves around approaches to solving these equations to arrive at fundamental understanding of the physics of transport in biosystems.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE605 BIOE Graduate Studies I (1 Credit)
Introduction to the bioengineering graduate program. Students gain exposure to departmental research through lab rotation and to current research in the field through seminar. Students will also gain preparation and guidance on other first-year academic requirements.
Restriction: Must be in ENGR: PhD Only-Bioengineering (Doctoral) program.

BIOE606 BIOE Graduate Studies II (1 Credit)
Second semester continued acclimation to the bioengineering graduate program. Students gain exposure to departmental research through lab rotation and to current research in the field through seminar.
Restriction: Must be in ENGR: PhD Only-Bioengineering (Doctoral) program.

BIOE608 Bioengineering Seminar Series (1 Credit)
A variety of topics related to Bioengineering will be presented in weekly seminars.
Restriction: Must be in one of the following programs (ENGR: PhD Only-Bioengineering (Master's); ENGR: PhD Only-Bioengineering (Doctoral)).
Repeatable to: 6 credits if content differs.

BIOE611 Advanced Tissue Engineering (3 Credits)
A review of the fundamental principles involved in the design of engineered tissues and organs. Both biological and engineering fundamentals will be considered.
Prerequisite: Must have completed at least one biology course; and MATH241. Or permission of ENGR-Fischell Department of Bioengineering department.
Recommended: BSCI330 and BIOE340.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE612 Physiological Evaluation of Bioengineering Designs (3 Credits)
Bioengineering designs of biomaterials, biomedical devices, imaging and drug delivery agents, tissue engineering, prosthesis (among others), offer the opportunity to improve health care. This course is aimed at providing knowledge to lead bioengineering designs on the basis of biocompatibility and to provide tools to assess their patho-physiological impact in biological systems.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.

BIOE613 Stem Cell Engineering (3 Credits)
Provides an introduction to the role of stem cells in tissue growth and development, the engineering of stem cells and their environments for regenerative medicine applications, and disease modeling. Topics covered will include basic stem cell biology and mechanobiology; experimental methods for growing, differentiating, studying, and characterizing stem cells; stem cell integration into engineered microenvironments (e.g., tissue scaffolds and biomaterials, organ-on-chip devices, 3D-printed biomaterials); stem cell engineering in clinical applications and disease models; and ethical, commercialization, and regulatory issues in the field of stem cell engineering.
Restriction: Permission of ENGR-Fischell Department of Bioengineering. Jointly offered with: BIOE413.
Credit Only Granted for: BIOE489J, BIOE413, BIOE689J or BIOE613.
Formerly: BIOE689J.

BIOE614 Computational Molecular Bioengineering (3 Credits)
Introduction to the principles, methods and software used for simulation and modeling of macromolecules of biological interest. Along with experiment and theory, computational modeling provides new tools for analysis, explanation and prediction.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE689D or BIOE614.
Formerly: BIOE689D.

BIOE631 Biosensor Techniques, Instrumentation, and Applications (3 Credits)
A thorough review of fundamental concepts of biosensing systems, principles of common detection methods, and modern applications of biosensors. Primarily literature driven. Students will obtain a detailed understanding of cutting-edge biosensing techniques, the instrumentation used, and the application space. Students also will develop skills in using current literature as a source of knowledge.
Prerequisite: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE631, BIOE689Z, or CHPH718Z.
Formerly: BIOE689Z.

BIOE632 Biophotonic Imaging and Microscopy (3 Credits)
Principles and instrumentation of various biomedical optical techniques, including fluorescene and Raman spectroscopy, confocal and multi-photon microscopy, optical coherence tomography, and diffuse optical tomography. Biomedical aplications will also be discussed.
Recommended: BIOE420.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: BIOE432, BIOE632, or BIOE689C.

BIOE640 Polymer Physics (3 Credits)
Graduate course covering theoretical aspects of the behavior of polymeric materials. It covers statistical properties and thermodynamics of single chain and multichain systems.
Prerequisite: ENMA471; or permission of instructor.
Credit Only Granted for: ENMA620 or BIOE640.

BIOE650 Quantitative Physiology of the Cell (3 Credits)
Introduction to quantitative aspects of neuronal, skeletal muscle, and cardiac physiological systems, with an emphasis on cellular function and plasticity. Complements BIOE603: Electrophysiology of the Cell.
Recommended: MATH246, MATH141, and MATH241.
Credit Only Granted for: BIOE689Q or BIOE650.
Formerly: BIOE689Q.

BIOE651 Applied Mathematics in Bioengineering (3 Credits)
Students will use and learn mathematical concepts that are directly relevant to their career as a bioengineer. They will apply these concepts to various bioengineering applications while also learning industry-relevant analytical software.
Restriction: Restricted to Master's of Engineering - Bioengineering students; or permission of Fischell Department of Bioengineering.
Credit Only Granted for: BIOE651 or BIOE658M.
Formerly: BIOE658M.

BIOE652 Regulatory Affairs in Medical Product Development (3 Credits)
An introductory course on regulations associated with the development and production of medical devices and pharmaceuticals.
Restriction: Restricted to Master's of Engineering - Bioengineering students; or permission of Fischell Department of Bioengineering.
Credit Only Granted for: BIOE652, ANTH627 or BIOE658R.
Formerly: BIOE658R.

BIOE653 Advanced Biomaterials (3 Credits)
Examine the relationship between structure and function of biomaterials. Study physical properties of synthetic and natural biomaterials. Understand molecular level interactions between biomolecules and biomaterials to design novel biomaterials with desirable characteristics. Application of biomaterials as implants, drug delivery systems, biosensors, and scaffold materials for tissue engineering will be covered.
Restriction: Permission of ENGR-Fischell Department of Bioengineering department.
Credit Only Granted for: ENMA625 or BIOE653.

BIOE654 Physiology for Bioengineers (3 Credits)
Bioengineering-based designs of biomaterials, biomedical devices, imaging and drug delivery agents, tissue engineering, and prosthesis (among others), offer the opportunity to improve health care. This course is aimed at providing biological knowledge to lead bioengineering designs on the basis of biocompatibility and to provide tools to assess their patho-physiological impact in biological systems.
Restriction: Restricted to Master's of Engineering - Bioengineering students; or permission of Fischell Department of Bioengineering.
Credit Only Granted for: BIOE654 or BIOE658P.
Formerly: BIOE658P.

BIOE658 Special Topics in Bioengineering (M.Eng.) (1-3 Credits)
Special topics in Bioengineering.
Restriction: Must be in the Master of Engineering program or Post-Baccalaureate Certificate of Engineering program; and permission of ENGR-Fischell Department of Bioengineering department.
Repeatable to: 99 credits if content differs.

BIOE664 Computational Molecular Bioengineering (3 Credits)
Designed to introduce students to the principles, methods, and software used for simulation and modeling of macromolecules of biological interest such as proteins, lipids, and polysaccharides. Along with experiment and theory, computational modeling provides new tools for analysis, explanation and prediction. The course is also useful for students who plan to use experimental techniques as their primary approach, but who will employ computational modeling as a tool to obtain integrative understanding of complex systems. Finally, the course should be valuable as an introductory overview for students planning to conduct their thesis research in computational modeling of biological systems. Class topics: Basic statistical thermodynamics, Force fields, Molecular dynamics/ monte carlo methods, Conformational analysis, Fluctuations & transport properties, Free-energy calculations, Multiscale modeling.
Restriction: Permission of ENGR-Fischell Department of Bioengineering.
Credit Only Granted for: BIOE489N, BIOE464, BIOE689U, or BIOE664.
Formerly: BIOE689U.

BIOE689 Special Topics in Bioengineering (1-3 Credits)
Research Oriented Individual Instruction course.
Repeatable to: 6 credits if content differs.

BIOE799 Master's Thesis Research (1-6 Credits)

BIOE898 Pre-Candidacy Research (1-8 Credits)

BIOE899 Doctoral Dissertation Research (1-8 Credits)

BIOL - Biology

BIOL600 Ethics in Scientific Research (2 Credits)
Issues of sceintific integrity with emphasis on investigators in the laboratory sciences, including mentoring, scientific record keeping, authorship and peer review, ownership of data, use of animals and humans in research, and conflict of interest.
Restriction: Must have completed at least one year of graduate study.
Credit Only Granted for: BIOL600 or ZOOL600.
Formerly: ZOOL600.

BIOL608 Biology Seminar (1-2 Credits)
Repeatable to: 8 credits if content differs.
Formerly: ZOOL608.

BIOL609 Special Problems in Biology (1-6 Credits)
One seminar per week for each subject selected: A-Cell Biology; B-Developmental Biology; C-Estuarine and Marine Biology; D-Genetics; E-Parasitology; F-Physiology; G-Systematics and Evolutionary Biology; I-Behavior; J-General; K-Endocrinology; L-Ecology.
Repeatable to: 6 credits if content differs.
Formerly: ZOOL609.

BIOL613 Recombinant DNA (3 Credits)
An advanced course presenting the tools and procedures of genetic engineering. Theory and practical applications of recombinant DNA techniques to understanding eukaryotic gene structure and expression.
Prerequisite: BSCI330 or BSCI230; and BSCI222. Or permission of instructor required.
Credit Only Granted for: BIOL613 or ZOOL652.
Formerly: ZOOL652.

BIOL615 Developmental Genetics (3 Credits)
Differential gene function and its regulation in developing systems. Genes and the analysis of developmental processes.
Prerequisite: Must have completed courses in molecular genetics and developmental or cell biology; or permission of instructor.
Credit Only Granted for: BIOL615 or ZOOL642.
Formerly: ZOOL642.

BIOL620 Cell Biology (3 Credits)
Offered with laboratory as BSCI 421. Molecular basis of cell structure and function in eukaryotes.

BIOL622 Membrane Transport Phenomena (3 Credits)
The fundamental phenomena related to solute movement in bulk solution and across interfaces. Examination of natural and artificial membrane transport systems, with emphasis placed on their mechanism of action.
Prerequisite: (MATH120; or must have completed MATH220); and (BSCI330 or BSCI230). Or permission of instructor.
Credit Only Granted for: BIOL622 or ZOOL622.
Formerly: ZOOL622.

BIOL625 Biological Ultrastructure (3 Credits)
The ultrastructure of cells and tissues, with emphasis on interpretation and correlation of ultrastructure and function.
Prerequisite: Must have completed a course in Cell Biology or Histology; or permission of instructor.
Credit Only Granted for: BIOL625 or ZOOL615.
Formerly: ZOOL615.

BIOL641 Comparative Physiology (4 Credits)
Cellular and biochemical processes used by animals to interact with both the external and cellular environment. Water balance, intermediary metabolism, nitrogen metabolism, anaerobic metabolism, thermal regulation, nerve and muscle physiology in cells from a broad variety of animal species are considered.
Prerequisite: One year of biology, one year of organic chemistry, and one semester of physiology.
Credit Only Granted for: BIOL641 or ZOOL621.
Formerly: ZOOL621.

BIOL646 Hearing (3 Credits)
Principles of hearing, covering the auditory periphery, the physiology and anatomy of the central auditory system and psychoacoustics.
Prerequisite: BSCI330 or BSCI230; or permission of instructor.

BIOL660 Theoretical Population and Community Ecology (3 Credits)
Application of simple dynamic systems and optimization models to understand the dynamics of populations and ecological communities; population growth, predator-prey interactions, competition, food webs, foraging theory, and evolution of life histories. Instruction and use of the program Mathematica.
Prerequisite: Must have completed one year of college calculus. And BSCI462; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: BIOL660 or ZOOL675.
Formerly: ZOOL675.

BIOL667 Mathematical Biology (4 Credits)
Mathematical methods of analyzing deterministic and stochastic biological processes from a variety of areas (including population and evolutionary biology, neurobiology, physiology, and morphogenesis). Qualitative aspects of dynamical systems which are usually given as difference or differential equations. The computer program Mathematica will be used to obtain the numerical solutions of these equations.
Credit Only Granted for: BIOL667 or ZOOL625.
Formerly: ZOOL625.

BIOL671 Molecular Evolution (3 Credits)
Basic foundations through advanced concepts in molecular evolution, including patterns and processes of DNA sequence variation, transposable element dynamics, gene duplication and loss, and genome organization. Relevant concepts from genetics, biochemistry, and phylogenetics also will be covered.
Credit Only Granted for: BIOL671 or ZOOL645.
Formerly: ZOOL645.

BIOL704 Cell Biology from a Biophysical Perspective (3 Credits)
An approach to cell biology by focusing on mechanisms and unifying paradigms. It will not assume a great deal of factual biological knowledge, but will expect a background that prepares students to think quantitatively and mechanistically.
Recommended: BSCI330, PHYS121, and PHYS122. Jointly offered with BSCI40 4.
Credit Only Granted for: BSCI404, BIOL704, BIOL708O, or BIPH704.
Formerly: BIOL708O.

BIOL705 Statistics & Modeling for Biologists (3 Credits)
An overview of essential probability and statistics using R with a focus on biological problems. Topics include: parameter estimation (likelihood, Bayesian), confidence intervals and hypothesis testing, multiple testing, experimental design and power analysis, and resampling-based measures of uncertainty. Practical use of computers will be emphasized.
Restriction: Must be in the Biological Sciences Graduate program; or permission of Biology Department.
Credit Only Granted for: BIOL705 or BIOL709F.
Formerly: BIOL709F.

BIOL708 Advanced Topics in Biology (1-4 Credits)
Lectures, experimental courses and other special instructions in various zoological subjects.
Repeatable to: 8 credits if content differs.
Credit Only Granted for: BIOL708 or ZOOL708.
Formerly: ZOOL708.

BIOL709 Selected Advanced Topics in Biology (1-4 Credits)
Lectures, experimental courses and other special instructions in various biological subjects.
Repeatable to: 16 credits.

BIOL710 Plant Ecological Genetics (3 Credits)
Plant ecological genetics is focused on the processes responsible for evolution in plant populations. Covers the basic principle of population genetics, then quickly shifts towards understanding how allele frequencies can change in an ecological context. Emphasis is placed on the role of drift and selection in evolution, and particular attention is placed on plant mating system evolution.
Prerequisite: BSCI472 and BSCI222; or permission of instructor.
Credit Only Granted for: BIOL710 or PBIO745.
Formerly: PBIO745.

BIOL762 Physiological Plant Ecology (2 Credits)
Environmental effects on plant ecophysiology. Microclimatology, leaf energy balance, plant responses to temperature and radiation, physiological adaptations, water relations and plant gas exchange.
Prerequisite: BSCI460; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: BIOL762 or PBIO755.
Formerly: PBIO755.

BIOL765 Sociobiology (4 Credits)
Deals with the description and analysis of animal social organizations the adaptive nature of animal societies, the effects of early experience, and the role of communication in the integration of animal groups.
Prerequisite: Must have completed a course in behavior.
Restriction: Permission of instructor.
Credit Only Granted for: BIOL765 or ZOOL665.
Formerly: ZOOL665.

BIOL767 Behavioral Endocrinology (3 Credits)
The interactive effects of hormones and behavior. Emphasis on the reproductive and stress hormones as they affect the brain and behavior.
Prerequisite: BSCI342 or BSCI447.
Credit Only Granted for: BIOL767 or ZOOL627.
Formerly: ZOOL627.

BIOL799 Master's Thesis Research (1-6 Credits)
Formerly: ZOOL799.

BIOL898 Pre-Candidacy Research (1-8 Credits)

BIOL899 Doctoral Dissertation Research (1-8 Credits)
Formerly: ZOOL899.

BIOM - Biometrics

BIOM405 Computer Applications in Biometrics (1 Credit)
An introduction to computer applications for data analysis. This is equivalent to the computer lab of 601 and is required for students that have taken BIOM 301 and BIOM402 and wish to go directly into BIOM602.

BIOM601 Biostatistics I (4 Credits)
Estimation and hypothesis testing, t tests, one and two way analysis of variance, regression, analysis of frequency data. Lecture will emphasize uses and limitations of these methods in biology, while the laboratory will emphasize the use of statistical analysis software for the analysis of biological data.
Prerequisite: BIOM301 or STAT464; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: BIOM401 or BIOM601.

BIOM602 Biostatistics II (4 Credits)
The principles of experimental design and analysis of variance and covariance.
Prerequisite: BIOM601 or BIOM405.

BIOM603 Biostatistics III (4 Credits)
Applications and implementation of linear model analysis to biological data, including multivariate regression model, mixed model, generalized linear mixed model, nonlinear logistic and Poisson regression models, power calculation and survival analysis.
Prerequisite: Must have completed a graduate-level statistical class; or students who have taken courses with comparable content may contact the department.

BIOM621 Applied Multivariate Statistics (3 Credits)
Brief review of matrix algebra, means, covariance matrices, multivariate normal, multivariate confidence ellipses, MANOVA, Discriminant Methods, Principal Component Analysis, Factor Analysis, Multidimensional Scaling, Cluster Analyses, and other topics, depending on student interest.
Prerequisite: BIOM602.
Recommended: BIOM603.

BIOM688 Topics in Biometrics (1-3 Credits)
Advanced topics of current interest in various areas of biometrics. Credit assigned will depend on lecture and/or laboratory time scheduled and organization of the course.
Restriction: Permission of AGNR-Animal & Avian Sciences department.
Repeatable to: 6 credits if content differs.

BIOM698 Special Problems in Biometrics (1-3 Credits)
Individual study of a particular topic in biostatistics or biomathematics.
Restriction: Permission of AGNR-Animal & Avian Sciences department; and permission of instructor.
Repeatable to: 6 credits if content differs.

BIOM699 Seminar in Biometrics (1 Credit)

BIPH - Biophysics

BIPH698 Biophysics Seminar (1 Credit)

BIPH699 Research in Biophysics (2 Credits)
Supervised research in biophysics laboratories. Rotations through several laboratories prior to a choice of laboratory for a research assistantship.
Restriction: Must be in one of the following programs (Biophysics (Master's); Biophysics (Doctoral)).
Repeatable to: 8 credits if content differs.

BIPH704 Cell Biology from a Biophysical Perspective (3 Credits)
An approach to cell biology by focusing on mechanisms and unifying paradigms. It will not assume a great deal of factual biological knowledge, but will expect a background that prepares students to think quantitatively and mechanistically.
Recommended: BSCI330, PHYS121, and PHYS122. Jointly offered with BSCI40 4, BIOL704.
Credit Only Granted for: BSCI404, BIOL704, BIOL708O, or BIPH704.

BIPH799 Master's Thesis Research (1-6 Credits)

BIPH898 Pre-Candidacy Research (1-8 Credits)

BIPH899 Doctoral Dissertation Research (1-8 Credits)

BISI - Biological Sciences

BISI610 Introduction to Behavior, Evolution, Ecology, & Systematics (2 Credits)
This literature-based course serves as an intellectual orientation for new (i.e. first- and second-year) doctoral students in the Behavior, Evolution, Ecology, and Systematics (BEES) concentration area of the Biological Sciences (BISI) Graduate Program.
Restriction: Must be in the Behavior, Evolution, Ecology, and Systematics (BEES) concentration area of the Biological Sciences program; or permission of the instructor.
Credit Only Granted for: BEES608A, BIOL608D or BISI610.
Formerly: BEES608A.

BISI620 Bioinformatics and Genomics (2 Credits)
Provides an overview of some major topics and research areas bioinformatics and genomics, and includes material from basic foundations through advanced concepts.
Credit Only Granted for: CBMG688Y or BISI620.
Formerly: CBMG688Y.

BISI632 Genetics I: Gene Expression (2 Credits)
Molecular mechanisms of gene expression, with an emphasis on gene regulation in both prokaryotic and eukaryotic systems. Approximately 2/3 of the classes will be comprised of didactic lectures. The remaining portion of the course will consist of student-led experimental design sessions and a student-led proposal review panel.
Restriction: Must be in the Biological Sciences Graduate Program (BISI); or permission of instructor.
Credit Only Granted for: BISI632 or CBMG688F.
Formerly: CBMG688F.

BISI699 Special Problems in Biological Sciences (1-6 Credits)
Independent study with a specific faculty instructor from the Biological Sciences Program (BISI). Often involves original research in a laboratory or computational setting.
Restriction: Must be in one of the concentration areas of the Biological Sciences Graduate Program (BISI).
Repeatable to: 8 credits.

BISI701 Teaching & Professional Development in Biology (1 Credit)
Provides graduate students in the biological sciences with the foundational knowledge to become better teaching assistants and gives them an introduction into the skills and tools that they need to develop as professional scientists and educators.Cross-listed with ENTM701.
Credit Only Granted for: ENTM701, BISI688Z, CBMG688Z, or BIOL701.
Formerly: BISI688Z, CBMG688Z, BIOL701.
Additional Information: Priority in enrollment will be given to students in the BISI Graduate Program.

BISI708 Advanced Topics in Biological Sciences (1-3 Credits)
Lectures, experimental courses, and other special instructions in various areas of biological sciences.
Repeatable to: 8 credits if content differs.

BISI712 Responsible Conduct of Research for Biologists (1 Credit)
An exploration of the ethical dimensions associated with the responsible conduct of scientific research focusing on providing students with practical insights into the existing norms and expectations of working scientists.
Credit Only Granted for: BISI712, BISI688B, or CBMG688B.
Formerly: BISI688B and CBMG688B.

BISI799 Master's Thesis Research (1-6 Credits)
Repeatable to: 99 credits.

BISI898 Pre-Candidacy Research (1-8 Credits)
Restriction: Must be in Biological Sciences (Doctoral) program.

BISI899 Doctoral Dissertation Research (1-8 Credits)

BMGT - Business and Management

BMGT402 Database Systems (3 Credits)
The fundamentals of database management systems (DBMS), data models, query processing, and data warehouses, and their application in the development of business information systems will be covered. An important goal of this course is to understand the value of information resources and information management challenges within an organization.
Recommended: BMGT302.
Credit Only Granted for: INST327 or BMGT402.

BMGT403 Systems Analysis and Design (3 Credits)
Techniques and tools applicable to the analysis and design of computer-based information systems. System life cycle, requirements analysis, logical design of databases and performance evaluation. Emphasis on case studies. Project required that involves the design, analysis and implementation of an information system.
Prerequisite: BMGT301; or students who have taken courses with comparable content may contact the department.
Recommended: BMGT302.

BMGT404 Essential Data Skills for Business Analytics (3 Credits)
Building on prior programming knowledge, this course introduces principles of data science to collect, analyze, and visualize business data. Students will explore application of business analytics in areas such as finance, accounting, marketing, and operations. This course especially emphasizes learning by doing exercises using a modern, high-level programming language and industry standard software.
Prerequisite: BMGT302.
Credit Only Granted for: BMGT404 or CMSC320.
Additional Information: CMSC majors will not receive credit for this course towards their upper level concentration in their CMSC major.

BMGT405 Data Communications and Networking (3 Credits)
Concepts of business data communications and data processing. Application of these ideas in computer networks, including basic principles of telecommunications technology, computer network technology, data management in distributed database systems and management of the technical and functional components of telecommunications technology.
Prerequisite: BMGT301; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: INST346 or BMGT405.

BMGT406 Developing Applications for the Web and Social Media (3 Credits)
The design and development of Web applications and the underlying platforms and standards for Web application development will be covered. It will examine the phenomenon of social media, social networking and crowdsourcing and understand their use within organizations.
Prerequisite: BMGT402 and BMGT302.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.
Credit Only Granted for: INST377 or BMGT406.

BMGT407 Information Systems Projects (3 Credits)
Senior capstone course for the decision and information sciences major. Collected knowledge from the DIS courses and application to significant problems of size and complexity. State-of-the-art research ideas and current business and industrial practices in information systems.
Prerequisite: BMGT402 and BMGT403.
Restriction: Senior standing.

BMGT408 Emerging Topics in Information Systems (3 Credits)
Selected advanced topics covering emerging developments in the field of decision and information technologies.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.

BMGT410 Government Accounting (3 Credits)
An introduction to the theory and practice of accounting and financial reporting as applied in both federal and state/local governments, with a focus on generally accepted accounting principles applicable in each. Topics include analyzing transactions; recognizing transactions in the accounting cycles; and preparing and analyzing financial statements and the overall financial reports at both the federal and state/local government levels.
Prerequisite: BMGT221.

BMGT411 Ethics and Professionalism in Accounting (3 Credits)
Analysis and discussion of issues relating to ethics and professionalism in accounting.
Prerequisite: BMGT311.
Restriction: Must be in Accounting program.

BMGT417 Taxation of Corporations, Partnerships and Estates (3 Credits)
Federal taxation of corporations using the life-cycle approach-formation, operation, assessment, merger, reorganization and liquidation. Overviews of pass-through entities - partnerships and s-corporations -using the life-cycle approach, and the tax consequences of wealth transfers by individuals - gift and estate taxation. Both tax planning and compliance issues are addressed.
Prerequisite: BMGT221.

BMGT422 Auditing Theory and Practice (3 Credits)
A study of the independent accountant's attest function, generally accepted auditing standards, compliance and substantive tests and report forms and opinions.
Prerequisite: BMGT310; and must have completed or be concurrently enrolled in BMGT311.

BMGT423 Fraud Examination (3 Credits)
Covers fraud prevention, detection and investigation techniques. The traditional accounting areas of fraud-fraudulent financial accounting and misappropriation of assets as well as recent and historical cases of fraud will also be examined. Current fraud topics will be discussed.
Prerequisite: BMGT310.

BMGT424 Advanced Accounting (3 Credits)
Advanced accounting theory applied to specialized topics and current problems. Emphasis on consolidated statements and partnership accounting.
Prerequisite: BMGT311.

BMGT428 Special Topics in Accounting (3 Credits)
Selected advanced topics in Accounting.
Prerequisite: BMGT310.
Restriction: Must be in Accounting program.
Repeatable to: 9 credits if content differs.

BMGT430 Data Modeling in Business (3 Credits)
Explores the role of statistical models in business analytics to drive managerial decision-making and improve performance through the use of relevant data-motivated examples. Topics include regression models (both simple and multiple regression, as well as logistic regression for binary data), model validation, variable transformation, variable selection, discriminant analysis, and forecasting. These topics are modeled using state-of-the-art data analytics software.
Prerequisite: BMGT231 or BMGT230; or permission of BMGT-Robert H. Smith School of Business.

BMGT431 Data Analytics (3 Credits)
An introduction to the tools and techniques that are central to the analysis of abundant data that is being collected in many forms including web traffic, social network data, and reviews and comments on websites.
Prerequisite: BMGT430.

BMGT434 Analytics Consulting: Cases and Projects (3 Credits)
This course assumes that students have already been introduced to the concepts and techniques of operations research/business analytics (OR/BA). Published papers, short cases, and projects in OR/BA will be analyzed and discussed in a thoughtful way, taking into account the soft (people-related) issues and the hard (mathematical/optimization) issues.
Prerequisite: BMGT332; and (MATH120 or MATH140; or must have completed MATH220). Or students who have taken courses with comparable content may contact the department.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT435 Business Process Simulation (3 Credits)
Develop and plan simulation studies, build simulation models with special purpose software, analyze and interpret the results. Extensive use of applications and real-world examples. The emphasis is on model formulation and the interpretation of results, rather than mathematical theory.
Prerequisite: BMGT231 or BMGT230; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT438 Special Topics in Operations Management (1-3 Credits)
Selected advanced topics in operations management.
Repeatable to: 6 credits if content differs.

BMGT440 Advanced Financial Management (3 Credits)
Analysis and discussion of cases and readings relating to financial decisions of the firm. The application of finance concepts to the solution of financial problems is emphasized.
Prerequisite: BMGT340.

BMGT441 Fixed Income (3 Credits)
Describes important financial instruments which have market values that are sensitive to interest rate movements. Develops tools to analyze interest rate sensitivity and value fixed income securities. Defines and explains the vocabulary of the bond management business.
Prerequisite: BMGT340.
Credit Only Granted for: BMGT448A or BMGT441.
Formerly: BMGT448A.

BMGT442 Advanced Portfolio Management (3 Credits)
An in-depth coverage of statistical methods for choosing stocks is provided. Financial markets data is used in the class. Students are also expected to learn and use an industry-standard programming language during the class to implement the concepts of the class.
Prerequisite: BMGT343 and BMGT347.

BMGT443 Applied Equity Analysis and Portfolio Management (3 Credits)
Study and application of the concepts, methods, models, and empirical findings to the analysis, valuation and selection of securities, especially common stock.
Prerequisite: BMGT343.

BMGT444 Futures and Options Contracts (3 Credits)
The institutional features and economic rationale underlying markets in futures and options. Hedging, speculation, structure of futures prices, interest rate futures, efficiency in futures markets and stock and commodity options.
Prerequisite: BMGT343.
Credit Only Granted for: BMGT444 or MATH424.

BMGT445 Banking and Financial Institutions (3 Credits)
Analysis and discussion of cases and readings in commercial bank management. The loan function is emphasized; also the management of liquidity reserves, investments for income and source of funds. Bank objectives, functions, policies, organization, structure, services and regulation are considered.
Prerequisite: BMGT340.
Recommended: ECON330 or BMGT341.

BMGT446 International Finance (3 Credits)
Financial management from the perspective of the multinational corporation. Topics covered include the organization and functions of foreign exchange and international capital markets, international capital budgeting, financing foreign trade and designing a global financing strategy. Emphasis of the course is on how to manage exchange and political risks while maximizing benefits from global opportunity sets faced by the firm.
Prerequisite: BMGT340.

BMGT447 Computational Finance (3 Credits)
Students will be introduced to tools for solving financial problems, specifically Excel functions and techniques, Visual Basic (VBA) Programming and Monte Carlo method & variations. Students will then apply these tools to solve problems related to options valuation, portfolio management, and risk management.
Prerequisite: BMGT343.
Credit Only Granted for: BMGT447 or BMGT448E.
Formerly: BMGT448E.

BMGT448 Special Topics in Finance (1-3 Credits)
Selected advanced topics in finance.
Repeatable to: 9 credits if content differs.

BMGT449 Investment Fund Management: Lemma Senbet Fund (3 Credits)
The Lemma Senbet Fund is a year-long, advanced finance course available to undergraduate finance majors in their senior year. Ten to twelve students will be selected in the spring of their junior year to participate on the fund, two as portfolio managers and eight to ten as equity analysts. The course provides students with the opportunity to apply what they have learned in finance classes to actual investment decisions, through researching real companies and managing a portfolio of real money.
Prerequisite: BMGT343.
Corequisite: BMGT443.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 6 credits if content differs.

BMGT450 Integrated Marketing Communications (3 Credits)
In-depth study of coordinated marketing activities including advertising, sales promotion, Internet marketing, direct marketing and personal selling. Emphasizes strategic planning to effectively use these promotional tools to communicate with customers and meet marketing goals. Blends theory and current practice to provide managerial orientation.
Prerequisite: BMGT350.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT354 or BMGT450.
Formerly: BMGT354.

BMGT451 Consumer Analysis (3 Credits)
Identifying buyer behavior concepts relevant to a specific marketing problem so that appropriate marketing decisions can be made. Conceptual frameworks are drawn from psychology, sociology, economics, and other social sciences to aid in understanding the behavior of ultimate and industrial buyers.
Prerequisite: BMGT350.
Recommended: PSYC100; and PSYC221.

BMGT452 Marketing Research Methods (3 Credits)
Focuses on aiding marketing decision-making through exploratory, descriptive and casual research. Develops student skills in designing market research studies, including selection of data collection method, development of data collection instrument, sample design, collection and statistical analysis of data and reporting the results.
Prerequisite: BMGT350 and BMGT230.

BMGT454 Global Marketing (3 Credits)
Marketing functions from the global executive's viewpoint, including coverage of global marketing policies relating to product adaptation, data collection and analysis, channels of distribution, pricing, communications and cost analysis. Consideration is given to the cultural, legal, financial and organizational aspects of global marketing.
Prerequisite: BMGT350.

BMGT455 Sales Management (3 Credits)
The roles of the sales executive as a planner, manager of resources and marketing functions and recruiter, trainer, motivator and leader of field sales personnel. Techniques and sequence of problem analysis for selling and sales management decisions and to the practical framework in which these decisions take place. Teaching vehicles feature strong classroom interactions, cases, journal articles, research findings, guest sales managers, debates, and modern company practices.
Prerequisite: BMGT350.

BMGT457 Marketing Policies and Strategies (3 Credits)
This capstone course ties together various marketing concepts using the fundamentals of strategic market planning as the framework. Application of these principles is accomplished by analyzing and discussing cases and by playing a marketing strategy computer simulation game. Analysis of current business articles to understand the link between theory and real-world problem solving.
Prerequisite: BMGT350.

BMGT458 Special Topics in Marketing (1-3 Credits)
Selected advanced topics in marketing.
Repeatable to: 6 credits if content differs.

BMGT461 Entrepreneurship (3 Credits)
Process of creating new ventures, including evaluating the entrepreneurial team, the opportunity and the financing requirements. Skills, concepts, mental attitudes and knowledge relevant for starting a new business.
Restriction: Must not have completed BMGT361.
Credit Only Granted for: BMGT261, BMGT361, BMGT461, ENES460, SMLP470 or HLMN470.

BMGT463 Cross-cultural Challenges in Business (3 Credits)
Examines in depth the nature of international cultural value-differences and their behavioral-related effects in the workplace. Topics include decision-making and leadership styles and reactions to various work assignments and reward structures.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT465 Business Plan For The New Venture (3 Credits)
Each student focuses on the production of a business plan that will be accepted for an annual business plan competition. Business plans of sufficient quality may be submitted to attract financing. Topics include a deep review of business construction and its derivative short forms.
Prerequisite: BMGT461 or BMGT361.

BMGT466 Global Business Strategy (3 Credits)
Focuses on the strategic challenges that directly result from and are associated with the globalization of industries and companies. Topics include drivers of industry globalization, difference between global and multi-domestic industry, global expansion strategies, sources of competitive advantage in a global context, and coordination of a company across a global network.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT467 Strategic Innovation and Entrepreneurship (3 Credits)
Provides an understanding of how innovation affects the competitive dynamics of markets, how firms can strategically manage innovation, and how firms can create and implement strategies to maximize their likelihood of success.
Credit Only Granted for: BMGT467, ENES463 or HLMN472.

BMGT468 Special Topics in Management and Organization (1-3 Credits)
Selected advanced topics in management and organization.
Repeatable to: 6 credits if content differs.

BMGT469 Management and Organization Short-term Study Abroad (3 Credits)
Selected short-term study abroad topics in management and organization.
Repeatable to: 9 credits if content differs.

BMGT471 Supply Chain Consulting Fellows I (3 Credits)
Prepares students for a career in Intermodal/Logistics/and Supply Chain Management. Designed to enhance student analytical skills in tackling issues of direct relevance to the operating efficiency and profitability of individual firms. Student will have direct exchanges with executive leaders in this field through participation in national conferences and in-class visits. Students will participate in a national student case competition that focuses on a critical issue facing the industry leaders. Under the direction of the instructor, students conduct academic research on key topics that represent real-world consulting engagements designed to address critical issues faced by the individual companies and result in research-based solutions to these current challenges.
Prerequisite: BMGT372.

BMGT472 Purchasing and Inbound Logistics (3 Credits)
Analysis of the resupply activities of logistics management, including purchasing policies, transportation planning, and inventory control. Attention is directed toward total cost minimization and the establishment of a sustainable competitive advantage based on procurement.
Prerequisite: BMGT372.

BMGT473 Supply Chain Consulting Fellows II (3 Credits)
This second course of the Supply Chain Consulting Fellows program is designed to build upon the skills and concepts learned in the initial course to produce polished, skilled consultants who can build a consulting project from its initial stages and carry it through to a set of actionable initiatives and conclusive results. The initial component of this course will be to enhance and complete the started projects in the previous semester's course so that each research project can be formally presented to the project sponsor, i.e., the Board of Advisors for the Intermodal Association of North America. Student teams will serve as project consultants and tackle a real-world problem presented by a designated firm. Students will also participate in a national conference devoted to Intermodal/Logistics/Supply Chain issues. The conference will involve individual academic sessions and reports by the students based on the content provided. The class will also include several Executive Leader sessions.
Prerequisite: BMGT370, BMGT372 and BMGT471.
Credit Only Granted for: BMGT478D or BMGT473.
Formerly: BMGT478D.

BMGT475 Supply Chain Strategy and Network Design (3 Credits)
Analysis of the strategic aspects of supply chain management. Emphasis on the creation of end-user value through supply chain cost reductions, service improvements or both. Attention is directed toward the enabling role of technology in support of strategy evaluation and implementation.
Prerequisite: BMGT372.

BMGT476 Technology Applications in Supply Chain Management (3 Credits)
An understanding of the role of technology in managing the supply chain. Provides students with hands-on experience in advanced software systems that build on top of enterprise resource planning systems. Major emphasis is placed on demonstrating that these systems result in supply chain cost reductions and service improvements.
Prerequisite: BMGT372.

BMGT477 International Supply Chain Management (3 Credits)
The study of the importance of the supply chain management within a global context. Topics covered include: the structure, service, pricing and competitive relationships among international carriers and transport intermediaries as well as documentation, location decisions, international sourcing/distribution and management of inventory throughout the international supply chain.

BMGT478 Special Topics in Supply Chain Management (3 Credits)
Selected advanced topics in supply chain management.
Repeatable to: 9 credits if content differs.
Additional Information: Course prerequisites will vary depending on the topic. A maximum of 3 credits of BMGT478 course work can fulfill Supply Chain Management major requirements.

BMGT484 Digital Marketing (3 Credits)
Examines the process of developing, implementing, and analyzing strategies for successfully marketing a variety of existing and potential products and services through digital means, including the web, social media, and mobile apps. Both the development and analysis of digital media for marketing will be discussed.
Prerequisite: BMGT350.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT485 Project Management (3 Credits)
Modern project management techniques that are used by modern practicing professionals will be covered. Particular attention is given to the management of technology based systems and projects in a business enterprise. The topics covered include: defining project scope, alignment of projects with enterprise strategy, managing project cost, time and risks using tools such as CPM/PERT, and measuring project performance.
Prerequisite: BMGT231 or BMGT230; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.

BMGT487 Six Sigma Innovation (3 Credits)
Enhances the overall understanding of Six Sigma Strategy, Tools and Methods to positively influence the performance of a business process, a product or service. Highlights the application of Define-Measure-Analyze-Improve-Control (DMAIC),Design For Six Sigma (DFSS), and the pursuit of Critical to Quality criteria (CTQ's) in a collaborative perspective, one that recognizes a balance between efficiency, and effectiveness and between statistical analysis and statistical thinking.
Prerequisite: STAT400, BMGT231, BMGT230, or ENME392.

BMGT488 Special Topics in Logistics, Business, and Public Policy (1-3 Credits)
Selected advanced topics in logistics, business and public policy.
Repeatable to: 6 credits if content differs.

BMGT490 QUEST Capstone Professional Practicum (4 Credits)
The capstone course for the QUEST Honors Program provides students with an opportunity to learn in multidisciplinary teams of business, engineering, and science students in a real-world setting. Companies engage teams of QUEST students with real organizational challenges and dedicate resources to help students address these problems. Student teams must enhance their skills in quality management, process improvement, and systems design and will apply these to add value to a client. In the process, students will improve their teamwork skills.
Prerequisite: ENES390 or BMGT390. Cross-listed with: ENES490.
Credit Only Granted for: BMGT490 or ENES490.

BMGT491 Scoping Experiential Learning Projects (3 Credits)
QUEST students cultivate relationships with new and current corporate partners and prepare project scopes for QUEST's introductory course, BMGT/ENES 190H, and capstone course, BMGT/ENES 490H. Requires independent work communicating with clients and class visits to a variety of potential project sites.
Prerequisite: BMGT190 or ENES190.
Restriction: Restricted to QUEST Program (TQMP) students. Cross-listed with ENES491.
Credit Only Granted for: BMGT491 or ENES491.

BMGT493 Honors Study (3 Credits)
First semester of the senior year. The course is designed for honors students who have elected to conduct intensive study (independent or group). The student will work under the direct guidance of a faculty advisor and the Assistant Dean of Undergraduate Studies. They shall determine that the area of study is of a scope and intensity deserving of a candidate's attention. Formal written and/or oral reports on the study may be required by the faculty advisor.
Restriction: Permission of BMGT-Robert H. Smith School of Business.

BMGT494 Honors Study (3 Credits)
Second semester of the senior year. The student shall continue and complete the research initiated in BMGT 493, additional reports may be required at the discretion of the faculty advisor and Assistant Dean of Undergraduate Studies.
Prerequisite: BMGT493.
Restriction: Permission of BMGT-Robert H. Smith School of Business; and must be in the Smith School Honors Fellows program.

BMGT495 Strategic Management (3 Credits)
A case-based course where students learn to play the role of the "strategic manager" who defines the scope of its business operations and, within the chosen scope, how the firm will compete against rivals. This course focuses on how a firm can both formulate effective business-level and corporate-level strategies to achieve competitive advantage and earn above average profits.

BMGT496 Business Ethics and Society (3 Credits)
A study of the standards of business conduct, morals and values as well as the role of business in society with consideration of the sometimes conflicting interests of and claims on the firm and its objectives. Emphasizes a strategic approach by business to the management of its external environment.
Prerequisite: 1 course in BMGT; or permission of BMGT-Robert H. Smith School of Business.

BMGT497 Strategic Management for Non Business Majors (2 Credits)
Focuses on how a firm can both formulate and implement effective business-level and corporate-level strategies to achieve competitive advantage and earn above average profits
Restriction: Must be admitted to the Minor in General Business or the Minor in Innovation and Entrepreneurship; and must not be a major in the R.H. Smith School of Business.
Additional Information: Course does not apply toward a Smith School degree.

BMGT498 Special Topics in Business and Management (3 Credits)
Special topics in business and management designed to meet the changing needs and interests of students and faculty.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 6 credits if content differs.

BMGT499 Advanced Business Topics (1 Credit)
Course will delve deeply into a specific business topic. Based on experience and knowledge from undergraduate core business classes, students will examine a particular subject from various angles.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.
Repeatable to: 3 credits if content differs.

BMGT600 Leadership and Teamwork (2 Credits)
Course examines concepts of team-building and leadership which are critical to managerial success. Topics include leadership, decision making, communication and conflict, work motivation, building effective teams, and organizational change and culture.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BMGT600, BUSI662 or BUSM600.

BMGT602 Introduction to Financial Accounting (2 Credits)
Overview of financial accounting, periodic financial statements and the financial reporting process. Importance of financial statements as information source for creditors and investors and as a means by which managers can communicate information about their firms.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI610, BUAC602, BUFN602, or BMGT602.

BMGT604 Managerial Economics and Public Policy (2 Credits)
Basic microeconomic principles used by firms, including supply and demand, elasticities, costs, productivity, pricing, market structure and competitive implications of alternative market structures. Market failures and government intervention. Public policy processes affecting business operations.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI681 or BMGT604.

BMGT606 Data Driven Decision Making (2 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI630 or BMGT606.

BMGT610 Financial Management (2 Credits)
Focuses on the valuation of the real assets of firms as well as the valuation of stocks and bonds, the primary financial assets in an economy. While details vary, the conceptual foundations of valuation boil down to three themes: time value of money, no-arbitrage, and systematic risk.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI640, BUFN610, or BMGT610.

BMGT612 Marketing Management (2 Credits)
Analysis of marketing problems and evaluation of specific marketing efforts regarding the organization's products and services, pricing activities, channel selection, and promotion strategies in both domestic and international markets.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI650 or BMGT612.

BMGT614 Strategic Management (2 Credits)
Analyze and identify profit opportunities and threats in different industry and competitive environments; Analyze and identify a firm's valuable assets, resources and capabilities and how they might be protected, leveraged, and extended in the market; Learn how to organize your company to be the best prepared to adapt its strategy over time as the market environment changes; and how to use organic growth as well as mergers, acquisitions, joint ventures, alliances, and divestitures to ensure that the firm maintians the proper scale and scope to compete effectively over time.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI690 or BMGT614.

BMGT616 Managerial Accounting (2 Credits)
Use of accounting data in corporate planning and control. Cost-volume-profit analysis, budgeting, pricing decisions and cost data, transfer pricing, activity-based management, performance measures, and standard costing.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI611, BUSI616, or BMGT616.

BMGT620 Business Communication (2 Credits)
Develop the ability to communicate with and about data.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI758A or BMGT620.

BMGT624 Operations Management (2 Credits)
Operations management is concerned with efficient and effective design and operation of business processes for delivering products and/or services. Emphasis is given to process analysis and design, capacity management and bottlenecks, waiting lines and the impact of uncertainty in process performance, quality management, lean, six-sigma, and revenue management.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI634 or BMGT624.

BMGT630 Data Models and Decisions (3 Credits)
To develop probabilistic and statistical concepts, methods and models through examples motivated by real-life data from business and to stress the role that statistics plays in the managerial decision making process.

BMGT640 Financial Management (3 Credits)
Analysis of major corporate financial decisions using a market-oriented framework. Introduction to value techniques, capital budgeting principles and problems, asset valuation, operation and efficiency of financial markets, financing decisions, dividend policy and international finance. Additional topics, such as mergers and acquisitions may be covered.

BMGT700 Competitive and Collaborative Negotiation (2 Credits)
Increase negotiating self-confidence and improve capacity to achieve win-win solutions to organizational problems. Improve effectiveness at finding creative solutions to conflict.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO714 or BMGT700.

BMGT708 Special Topics in Cybersecurity (3 Credits)
Special Topics in Cybersecurity
Repeatable to: 9 credits if content differs.

BMGT710 Global Strategy (2 Credits)
Focuses on the "strategic" and "organizational" questions that a company must address as it globalizes its footprint. Among the questions that will be addressed are: What are the potential benefits, costs, and risks associated with going abroad? What differentiates a "global" from a "multidomestic" industry? What are the sources of competitive advantage in a global context?
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI674, BUMO754, or BMGT710.

BMGT720 Innovation & Product Development (2 Credits)
This course focuses on the development of innovations - new products or new services - from the perspective of a marketer. For an innovation to be successful in the market, it has to be customer-centric: hence, in this course, we study how to develop and bring to market elegant and efficient solutions to strong customer needs. This is a fundamental business challenge, faced while working in a startup or in an established company; when developing a new product or a new service; and when serving customers who are individuals or large corporations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758P or BMGT720.

BMGT730 Valuation in Corporate Finance (2 Credits)
An advanced topics course in Corporate Finance dealing with valuation. Main topics will be, building pro forma statements, cost of capital, using ratios and comparables to value projects and firms, dicounted cash flow valuations, WACC and APV methods of valuation and Real Option Valuations.
Prerequisite: BMGT600.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN630, BUFN714, BUFN750, BUFN753, or BMGT730.

BMGT740 Global Supply Chain Management (2 Credits)
Offers a practical blueprint for understanding, building, implementing, and sustaining supply chains in today's rapidly changing global supply chain environment. It will provide the student with a survey of the fast-moving Supply Chain Management discipline and practice, including the evolution of supply chain strategies, business models and technologies; current best practices in demand and supply management; and methodologies for conducting supply chain-wide diagnostic assessments and formulating process improvement plans.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI672 or BMGT740.

BMGT758 Special Topics in Business and Management (1-4 Credits)
Selected advanced topics in the various fields of graduate study in business.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.

BMGT788 Mastery Topic for EMBA (2 Credits)
Selected mastery topics which will cover various aspects of executive education.
Restriction: Must be in Executive MBA program.
Repeatable to: 8 credits if content differs.

BMGT789 Action Learning Project (3-4 Credits)
Significant consulting project, team designed by individual EMBA student participants and faculty.
Restriction: Must be in Executive MBA program.
Repeatable to: 10 credits if content differs.

BMGT808 Special Topics in Information Systems (1-9 Credits)
Special topics specific to the Information Systems doctoral field of study.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 18 credits if content differs.

BMGT811 Seminar in Financial Accounting (3 Credits)
Seminar in selected classic and current theoretical and empirical research in financial accounting.

BMGT818 Special Topics in Accounting and Information Assurance (1-9 Credits)
Special topics specific to the Accounting and Information Assurance doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT821 Seminar in Management Accounting (3 Credits)
Design and use of accounting information systems for managerial planning and controllership.

BMGT828 Independent Study in Business and Management (1-9 Credits)

BMGT830 Operations Research: Linear Programming (3 Credits)
Concepts and applications of linear programming models, theoretical development of the simplex algorithm, and primal-dual problems and theory.
Prerequisite: MATH240; or students who have taken courses with comparable content may contact the department; or permission of BMGT-Robert H. Smith School of Business.

BMGT831 Operations Research: Extension of Linear Programming and Network Analysis (3 Credits)
Concepts and applications of network and graph theory in linear and combinatorial models with emphasis on computational algorithms.
Prerequisite: BMGT830; or students who have taken courses with comparable content may contact the department; or permission of BMGT-Robert H. Smith School of Business.

BMGT833 Operations Research: Integer Programming (3 Credits)
Theory, applications, and computational methods of integer optimization. Zero-one implicit enumeration, branch and bound methods, and cutting plane methods.
Prerequisite: BMGT830; and (MATH241; or students who have taken courses with comparable content may contact the department). Or permission of BMGT-Robert H. Smith School of Business.

BMGT834 Operations Research: Probabilistic Models (3 Credits)
Theoretical foundations for the construction, optimization, and applications of probabilistic models. Queueing theory, inventory theory, Markov processes, renewal theory, and stochastic linear programming.
Prerequisite: MATH241; and (STAT400; or students who have taken courses with comparable content may contact the department). Or permission of BMGT-Robert H. Smith School of Business.

BMGT835 Simulation of Discrete-Event Systems (3 Credits)
Simulation modeling and analysis of stochastic discrete-event systems such as manufacturing systems, inventory control systems, and computer/ communications networks.
Prerequisite: Knowledge of Fortran, Basic, C, or Pascal.

BMGT836 Applied Regression Models (3 Credits)
An introduction to regression models used in business research. Topics include: simple and multiple regression, diagnostics for checking model adequacy, transformations, polynomial models, indicator variables, multicollinearity, variable selection, times series data, generalized linear models, implementation using statistical software, and application to research questions.
Recommended: It is assumed that the student has taken a first course in statistics and is familiar with the content of such course including interval estimation and hypothesis testing.

BMGT837 Applied Multivariate Analysis (3 Credits)
Multivariate statistical methods and their use in empirical research. Topics include: summarization and visualization of multivariate data, the multivariate normal distribution, tests on mean vectors, multivariate paired comparisons, multivariate analysis of variance, repeated measures designs, test on covariance matrices, discriminant analysis and classification, canonical correlation, principal components, factor analysis and cluster analysis. Maximum likelihood estimation and the likelihood ratio method of test construction.
Recommended: BMGT836 or equivalent course. BMGT837 assumes working knowledge of matrices and elementary linear algebra and a sound understanding of univariate statistics, including random variables, statistical inference, ANOVA, and ordinary least squares regression.

BMGT838 Special Topics in Operations Management/Management Science (1-9 Credits)
Special topics specific to the Operations Management/Management Science doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT840 Seminar in Financial Theory (3 Credits)
Seminar in selected classic and current theoretical and empirical research in the foundations of finance.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.

BMGT841 Seminar in Corporate Finance (3 Credits)
Seminar in selected classic and current theoretical and empirical research in corporate finance.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.

BMGT843 Seminar in Portfolio Theory (3 Credits)
Seminar in selected classic and current theoretical and empirical research in portfolio theory.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.

BMGT848 Special Topics in Finance (1-9 Credits)
Special topics specific to the Finance doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT858 Special Topics in Marketing (1-9 Credits)
Special topics specific to the Marketing doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT868 Special Topics in Organizational Behavior/Human Resource Management (1-9 Credits)
Special topics specific to the Organizational Behavior/Human Resource Management doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT878 Special Topics in Strategic Management and Entrepreneurship (1-9 Credits)
Special topics specific to the Strategic Management and Entrepreneurship doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT887 Bayesian Inference and Decision Theory (3 Credits)
Bayesian Methodologies in statistical inference and decision theory. Includes discussion of subjective probability and coherence, elicitation of distributions conjugate distributions, estimation, testing, preposterior analysis and regression analysis. Applications are drawn from the functional business areas.

BMGT888 Special Topics in Supply Chain Management (1-9 Credits)
Special topics specific to the Supply Chain Management doctoral field of study.
Repeatable to: 18 credits if content differs.

BMGT898 Pre-Candidacy Research (1-8 Credits)

BMGT899 Doctoral Dissertation Research (1-8 Credits)

BSCI - Biological Sciences Program

BSCI401 Animal Communication (3 Credits)
Examining the mechanisms by which animal produce and receive signals in each sensory modality; and quantifying the type and amount of information conveyed in signals and how animals attend to such information.
Prerequisite: BSCI160 and BSCI161; or BSCI106. And must have completed one semester of physics; and must have completed one semester of organic chemistry.
Recommended: A course in animal behavior or biopsychology.
Credit Only Granted for: BSCI401, BSCI 338W or BIOL 708W.
Formerly: BSCI338W.

BSCI402 Genomics of Sensory Systems (3 Credits)
An advanced course covering topics on the molecular basis of senses and the application of genomic techniques to studies of sensory systems & sensory ecology.
Prerequisite: BSCI222; or permission of instructor.
Credit Only Granted for: BSCI338C or BSCI402.
Formerly: BSCI338C.

BSCI403 Biology of Vision (3 Credits)
An upper level undergraduate course on the physical, molecular, and neural basis of vision.
Prerequisite: BSCI207.
Recommended: BSCI222.
Credit Only Granted for: BSCI 338V or BSCI 403.
Formerly: BSCI 338V.

BSCI404 Cell Biology from a Biophysical Perspective (3 Credits)
An approach to cell biology by focusing on mechanisms and unifying physical paradigms. It will not assume a great deal of factual biological knowledge, but will expect a background that prepares students to think mechanistically and quantitatively.
Prerequisite: BSCI330.
Recommended: PHYS121 and PHYS122; or completion of PHYS131 and PHYS132 recommended. Jointly offered with BIOL704, BIPH7 04.
Credit Only Granted for: BSCI338O, BSCI404, BIOL704, BIOL708O, or BIPH704.
Formerly: BSCI338O.

BSCI405 Population and Evolutionary Genetics (3 Credits)
Genetic variation within a population provides the basis for future evolution as well as a record of past evolution. The genomics revolution provides data on this variation that, together with mathematical models, allow us to read this record to reconstruct evolutionary trajectories. Examples will focus on hominin and pathogen evolution. In the lab, students will use models to explore how genetic variation (allele frequencies) changes over time and space.
Prerequisite: Minimum grade of C- in BSCI222; and 1 course with a minimum grade of C- from (MATH131, MATH136, MATH141). Jointly offered w ith BIOL709.
Credit Only Granted for: BSCI405, BSCI339J, or BIOL709C.
Formerly: BSCI339J.

BSCI406 Membranes and Biological Interfaces (3 Credits)
An interdisciplinary approach to membrane biology, starting with the physical chemistry of interfaces and model systems and continuing into transport, excitability, and signaling. The course is oriented toward students with broad backgrounds in biology and biophysics. Success in the course will come from a background that prepares students to think mechanistically and quantitatively rather than having substantial factual biological knowledge.
Prerequisite: Minimum grade of C- in BSCI330.
Recommended: PHYS122; or PHYS132; or (PHYS260 and PHYS261).
Credit Only Granted for: BSCI339R, BSCI406, or BIOL709R.
Formerly: BSCI339R.

BSCI407 Behavioral Genetics (3 Credits)
Behavior represents an organism's most dynamic phenotype and allows an animal to respond immediately to both internal and external cues. We will explore the genetic and epigenetic mechanisms that underlie behavioral variation and the associated neurological, hormonal, and developmental pathways. We will examine modern approaches used to study behavioral genetics in model and non-model systems, and in humans. Using case studies, we will explore a range of complex phenotypes including those related to mating, parental care, aggression, circadian rhythm, locomotion, learning, anxiety, and addiction.
Prerequisite: Minimum grade of C- in BSCI222.

BSCI410 Molecular Genetics (3 Credits)
An advanced genetics course emphasizing the molecular basis of gene structure and function in the context of modern approaches to the genetics of humans and model organisms.
Prerequisite: BSCI222. And must have completed CHEM233; or (CHEM231 and CHEM232).

BSCI411 Bioinformatics and Integrated Genomics (4 Credits)
Computational methods for the study of biological sequence data in comparative biology and evolution. Analysis of genome content and organization. Database searching, pairwise and multiple sequence alignment, phylogenetic, methods, pattern recognition, and functional inference. Functional and comparative genomics approaches.
Prerequisite: Minimum grade of C- in BSCI222.
Recommended: BSCI410.
Credit Only Granted for: BSCI380 or BSCI411.
Formerly: BSCI380.

BSCI412 Microbial Genetics (4 Credits)
A laboratory/lecture based course that covers the fundamentals of mutation, mobile genetic elements and transmission genetics of microbial organisms using both classical and molecular approaches.
Prerequisite: BSCI223 and BSCI222.

BSCI413 Recombinant DNA (3 Credits)
An advanced course presenting the tools and procedures of genetic engineering. Theory and practical applications of recombinant DNA techniques to understanding eukaryotic gene structure and expression.
Prerequisite: BSCI330, BSCI223, or BSCI230; and BSCI222.
Formerly: ZOOL452.

BSCI414 Recombinant DNA Laboratory (3 Credits)
An advanced course offering hands-on experience in performing recombinant DNA experiments. All current molecular biology techniques used for cloning prokaryotic genes, analyzing the gene products, and modifying the genes will be performed. Techniques include isolation of DNA, use of restriction enzymes; cloning procedures, PCR analysis, and Southern hybridizations. Lecture material focuses on interpretation of results generated in the laboratory.
Prerequisite: BSCI222.

BSCI415 Molecular Genetics Laboratory (3 Credits)
Problem solving laboratory organized around extended projects that employ different approaches toward linking gene and function.
Prerequisite: Must have completed or be concurrently enrolled in BSCI410.
Restriction: Junior standing or higher.
Credit Only Granted for: BSCI348G or BSCI415.
Formerly: BSCI348G.

BSCI416 Human Genetics (3 Credits)
Approaches to human genetics and applications to biology and medicine focusing on specific human genetic topics using primary research papers as the main resource.
Prerequisite: Minimum grade of C- in BSCI410.
Recommended: BSCI330.

BSCI417 Microbial Pathogenesis (3 Credits)
Current research in microbial pathogenesis and the molecular and cellular basis of bacterial disease. Comprehensive overview of the molecular basis of pathogenesis with a focus on model microbial systems to illustrate mechanisms of disease pathogenesis. Topics covered: how microorganisms attach to and enter cells; how host cells are damaged by microbial products; how the host responds to invasion; and host-pathogen evolution.
Prerequisite: BSCI223 and BSCI222.
Restriction: Junior standing or higher.
Credit Only Granted for: BSCI348M or BSCI417.
Formerly: BSCI348M.

BSCI420 Cell Biology Lectures (3 Credits)
Molecular and biochemical bases of cellular organization and function in eukaryotes.
Prerequisite: BSCI330, BSCI222, CHEM231, and CHEM232.
Credit Only Granted for: BSCI420 or BSCI421.

BSCI421 Cell Biology (4 Credits)
Molecular and biochemical basis of cellular organization and function in eukaryotes.
Prerequisite: BSCI330, BSCI222, CHEM231, and CHEM232.
Credit Only Granted for: BSCI420 or BSCI421.

BSCI422 Principles of Immunology (3 Credits)
The immune system in health and disease. Presentation and analysis of the cellular and molecular processes that comprise the immune system.
Prerequisite: BSCI223 and BSCI222.
Recommended: BSCI330.
Restriction: Junior standing or higher.

BSCI423 Immunology Laboratory (2 Credits)
Current techniques for assessment of immune status and evaluation of the immune response, including monoclonal antibody production, Western blotting, cytokine assays, ELISA and flow cytometry.
Prerequisite: BSCI223 and BSCI222.
Corequisite: BSCI422.
Restriction: Junior standing or higher.

BSCI424 Pathogenic Microbiology (4 Credits)
The role of bacteria and fungi in the diseases of humans with emphasis upon the differentiation and culture of microorganisms, types of disease, modes of disease transmission, prophylactic, therapeutic, and epidemiological aspects.
Prerequisite: BSCI223.

BSCI425 Advanced Cell Biology Lab Practices (2 Credits)
Experimental techniques used to study the molecular, structural, and spatial organization of plant and animal cells. Using a combination of in vitro assays aimed at analyzing macromolecular and subcellular components and in vivo analyses designed to reveal the inner architecture of a typical eukaryotic cell, students will have an opportunity to: improve some of the basic technical and conceptual skills they acquired in an introductory cell biology course; develop a more sophisticated understanding of the nature of experimental cell manipulation; and tackle the ongoing challenge of articulating their findings in both written and oral communication.
Prerequisite: Must have completed BSCI330, BSCI222, CHEM231, and CHEM232; and must have completed or be concurrently enrolled in BSCI420.
Credit Only Granted for: BSCI421, BSCI425, or BSCI348C.

BSCI427 Principles of Microscopy (2 Credits)
An introduction to optical principles that underlie light and electron microscopic image formation. Brightfield, darkfield, phase contrast, differential interference contrast, fluorescence and polarized light microscopy. Comparison of light and electron microscopy. The application of these techniques to problems in biological research.
Prerequisite: BSCI421.

BSCI430 Developmental Biology (3 Credits)
Structural, functional and regulatory events and mechanisms that operate during development to produce an integrated, multicellular organism composed of a multitude of differentiated cell types.
Prerequisite: BSCI222 and BSCI330.

BSCI431 The Origin and Evolution of Nervous Systems (3 Credits)
Explore how brains change through evolution along the animal tree of life. By comparing the nervous system structure and development across the animal kingdom, this course aims to reveal common designs and mechanisms that generate behavior, and to inform our understanding of how biology builds minds. Topics include the origins of neurons, the universal molecular patterning of brain development across invertebrates and vertebrates, the evolution of neurotransmission, comparative mechanisms of learning and memory, and what in our brain makes us human.
Prerequisite: Minimum grade of C- in NEUR200, BSCI353 or NEUR306.

BSCI432 Systems View of Cell Biology (3 Credits)
An integrated understanding of cell biology based upon reading of literature, discussion of new findings, and quantitative simulations. Exploration of ten topics including Heredity, Curing Diseases, and Synthesizing Life.
Prerequisite: BSCI330.

BSCI433 Biology of Cancer (3 Credits)
Causes and consequences of neoplastic transformations at the biochemical and cellular levels.
Prerequisite: BSCI222 and BSCI330; or permission of CMNS-Biological Sciences UG Program.

BSCI437 General Virology (3 Credits)
Discussion of the physical and chemical nature of viruses, virus cultivation and assay methods, virus replication, viral diseases with emphasis on the oncogenic viruses, viral genetics, and characteristics of the major virus groups.
Prerequisite: BSCI222; or permission of CMNS-Biological Sciences UG Program.
Restriction: Junior standing or higher.

BSCI440 Mammalian Physiology (4 Credits)
A study of the cardiovascular, hemopoietic, gastrointestinal, renal and respiratory systems. Chemical and endocrine regulation of physiological functions in mammals. Course does not count as an upper level lab for BIOL majors (see BSCI441).
Prerequisite: BSCI330; and (CHEM231 and CHEM232; or must have completed CHEM233). Or permission of CMNS-Biological Sciences UG Program.

BSCI441 Mammalian Physiology Laboratory (2 Credits)
Laboratory exercises in experimental mammalian physiology.
Prerequisite: Must have completed or be concurrently enrolled in BSCI440.

BSCI442 Plant Physiology (4 Credits)
A survey of plant physiology and development and responses and adaptation to the environment
Prerequisite: BSCI170 and BSCI171; or BSCI105; or PLSC201. And CHEM231 and CHEM232; or CHEM237; or permission of CMNS-Biological Sciences UG Program; or permission of AGNR-Plant Science & Landscape Architecture department. Cross-listed with PLSC400.
Credit Only Granted for: BSCI442 or PLSC400.

BSCI443 Microbial Physiology (3 Credits)
Microbial cellular and population growth. Fermentation metabolism, physiology of anaerobiosis, and energy conservation and transformation in bacterial membranes. Efficiency of energy utilization for growth. Membrane structure and transport. Bacterial chemotaxis. Regulation of bacterial chromosome replication, RNA and protein synthesis. Control of metabolic pathways.
Prerequisite: Minimum grade of C- in BSCI223. And minimum grade of C- in BCHM461; or minimum grade of C- in BCHM463.

BSCI446 Neural Systems (3 Credits)
Neural development, followed by sensory, motor and integrative system organization in the central nervous system.
Prerequisite: Minimum grade of C- in BSCI330 and BSCI353.

BSCI447 General Endocrinology (3 Credits)
Functions and dysfunctions of the endocrine system with special reference to mammals.
Prerequisite: BSCI330, CHEM241, and CHEM242.

BSCI452 Diseases of the Nervous System (3 Credits)
An advanced course covering the neuroanatomy, function, and organization of the nervous system and its implication for pathology and disease.
Prerequisite: Minimum grade of C- in BSCI330; and minimum grade of C- in BSCI353. Jointly offered with NACS728, BIOL708.
Credit Only Granted for: BSCI452, BSCI338N, BIOL708E, or NACS728N.
Formerly: BSCI338N.

BSCI454 Neurobiology Laboratory (1 Credit)
Basic neuroanatomical techniques, intracellular and extracellular recordings of electrical potentials from nerve and muscle.
Prerequisite: Minimum grade of C- in BSCI330; and must have completed or be concurrently enrolled in BSCI353; and must have completed or be concurrently enrolled in PHYS122, PHYS132, or PHYS142.

BSCI456 Advanced Cellular Neuroscience (3 Credits)
Readings and discussion in cellular and molecular mechanisms underlying synaptic structure/function relationships, synaptic potentiation/depression, dendritic integration, homeostatic plasticity, and nervous system development including neurogenesis, axon guidance, synaptogenesis, and activity-dependent development among other topics.
Prerequisite: Minimum grade of C- in BSCI353 or NEUR306.
Recommended: Minimum grade of C- in BSCI440 or another upper-level neuroscience course.
Restriction: Permission of CMNS-Biology department. Jointly offered with: NACS644.
Credit Only Granted for: BSCI339X, BSCI456, or NACS644.
Formerly: BSCI339X.

BSCI460 Plant Ecology (3 Credits)
The dynamics of populations as affected by environmental factors with special emphasis on the structure and composition of natural plant communities, both terrestrial and aquatic.
Prerequisite: Minimum grade of C- in BSCI361.

BSCI462 Population Ecology (3 Credits)
Theory of population growth and regulation, life tables, and theory of competition and predation, evolution in ecological settings, community structure and dynamics.
Prerequisite: MATH130, MATH136, or MATH140; and BSCI361.

BSCI464 Microbial Ecology (3 Credits)
Interaction of microorganisms with the environment, other microorganisms and with higher organisms. Roles of microorganisms in the biosphere. Microorganisms and current environmental problems.
Prerequisite: BSCI223 and CHEM241. And must have completed CHEM243; or CHEM242.

BSCI465 Behavioral Ecology (3 Credits)
How natural and social environments shape individual behavior. The influence of evolution on patterns of individual adaptation. Use of the evolutionary paradigm to investigate specific problems in animal and human behavior.
Prerequisite: BSCI160 and BSCI161; or BSCI106. And BSCI222.

BSCI467 Freshwater Biology (4 Credits)
Biology and ecology of freshwater invertebrates in lotic and lentic habitats, their adaptation to aquatic life, their function in aquatic ecosystems, and their relationship to environmental deterioration. Laboratory will include field trips, demonstrations, and identifications.

BSCI471 Molecular Evolution (3 Credits)
Patterns of DNA sequence variation within and between species, caused by nucleotide changes and the movement of transposable elements. Theories of molecular evolution, such as the neutral theory. Molecular clock hypothesis: its importance as a practical empirical tool in molecular genetics and systematics and its theoretical foundation.
Prerequisite: BSCI222; or permission of CMNS-Biology department.

BSCI472 Evolutionary Biology of Plants (3 Credits)
Evolution in plant populations. The pace, pattern, and mechanisms of evolution will be discussed within a genetic and ecological framework. Some emphasis will be placed on processes that are unique to the evolution of plants.
Prerequisite: BSCI160 and BSCI161; or BSCI106. And BSCI222.

BSCI473 Marine Ecology (3 Credits)
Courses in evolution and animal behavior are strongly recommended. A detailed analysis of the evolutionary ecology of marine invertebrates; emphasis on testing of theories and on current literature.
Prerequisite: BSCI207.

BSCI475 Sexual Selection in Nature (3 Credits)
Sexual selection drives some of the most spectacular, if not bizarre, traits in nature. We will explore how organisms select and compete for mates and fertilization success, and how this powerful and pervasive evolutionary force shapes sexual traits and regulates species boundaries. We will focus on the key theories in the field and discuss recent and classic research papers. This is a student-directed class: course topics and materials will be selected based on student interests and involvement. On occasion, experts in the field will be invited to class to discuss their research.
Prerequisite: Minimum grade of C- in BSCI207; or permission of instructor.
Recommended: BSCI360 or BSCI370. Jointly offered with BIOL 708.
Credit Only Granted for: BSCI338X, BSCI475, or BIOL708X. Form erly: BSCI338X.

BSCI480 Arthropod Form and Function (4 Credits)
Survey of the morphological, systematic and physiological diversity of the phylum Arthropoda.
Prerequisite: Permission of CMNS-Entomology (AGNR).

BSCI481 Insect Diversity and Classification (4 Credits)
The techniques of collecting insects in the field and their classification into the latest hierarchical scheme. Field trips will visit habitats throughout the state. An insect collection is required.
Prerequisite: BSCI337.

BSCI482 Insect Physiology and Molecular Biology (4 Credits)
Physiological and biochemical functions of insects. Insect endocrinology, neurobiology, sensory physiology, integument and molting, development and metamorphosis, immunity, metabolism and related topics.
Prerequisite: BSCI337.

BSCI483 Insects, Pathogens, and Public Health (3 Credits)
Mosquito- and tick-borne disease transmission poses significant challenges to human health and well-being globally, and is on the rise in North America. Arthropod parasites and the pathogens they transmit to humans and animals will be introduced, and the public health significance of these arthropods will be examined. The ecology and behavior of vectors in relation to disease transmission will be emphasized.
Prerequisite: BSCI207.

BSCI488 Summer Biology Institutes (1-8 Credits)
Prerequisite: Permission of CMNS-Biological Sciences UG Program.
Repeatable to: 12 credits if content differs.

BSCI493 Medicinal and Poisonous Plants (3 Credits)
A study of plants important to humans that have medicinal or poisonous properties. Emphasis on plant source, plant description, the active agent and its beneficial or detrimental physiological action and effects.
Prerequisite: (BSCI170 and BSCI171; or BSCI105); and must have completed CHEM233. Or 4 credits in BSCI courses.

BSCI494 Animal-Plant Interactions (3 Credits)
Theoretical, conceptual and applied aspects of evolutionary and ecological interactions between plants and animals. This course gives an overview of major ideas, historical controversies, and current research on animal-plant relationships. We will explore the mechanisms and evolution of plant defenses and animal counter-adaptations, behavioral ecology and interactions across trophic levels, the role of microbial communities in mediating interactions, and how these interactions color human experience through food and medicine. The course will have a blended lecture/discussion format and will include field walks to collect herbivory data and observe animal-plant interactions.
Prerequisite: BSCI160 and BSCI161; or BSCI106.

BSCI497 Insect Pests of Ornamentals and Turf (4 Credits)
The recognition, biology and management of insects and mites injurious to ornamental shrubs, trees, greenhouse crops, and turf. Emphasis on Integrated Pest Management (IPM).

BSOS - Behavioral and Social Sciences

BSOS438 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

BSOS448 Teaching Assistant Practicum (1-6 Credits)
Supervised practicum for teaching assistants for BSOS/UNIV courses.
Repeatable to: 9 credits.

BSOS678 Special Topics in Justice Leadership (3 Credits)
Crime and Criminal Justice in Vietnam. Issues that will be focused on the present situation of crime in Vietnam; causes and conditions of criminal activities; include crime forecasting and crime prevention in Vietnam. Also, provides comprehensive overview on the Criminal Justice System in Vietnam and relations among authorities.
Repeatable to: 18 credits if content differs.

BSOS685 Big-Data Analysis on the BSOS HPC Cluster (2 Credits)
Social media are a primary source of information on social interaction and personal interests. High-performance computing (HPC) is employed to search for hidden pattern and unknown correlations using advanced machine-learning algorithms available in python and R packages. The main steps of Natural Language Processing and big-data analysis are being worked out, from examining random samples to analyzing large data sets via in-memory Monte-Carlo applications and neural networks.
Prerequisite: Students must have completed a least one college-level statistics course.
Recommended: A working knowledge of python or R is expected.
Restriction: Students must be enrolled in a BSOS graduate program; or permission of instructor.
Credit Only Granted for: BSOS385, BSOS685, or BSOS688B.
Formerly: BSOS688B.

BSST - Terrorism Studies

BSST458 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

BSST630 Motivations and Intents of Terrorists and Terrorist Groups (3 Credits)
Examines motivations for terrorism from an interdisciplinary perspective, with emphasis on political and applied social psychological perspective. Topics may include: defining terrorism; preconditions; recruitment; domestic and international terrorism; and case studies and analysis of terrorist organizations.
Restriction: Must be in the Terrorism Analysis Graduate Certificate Program.
Credit Only Granted for: BSOS630 or BSST630.
Formerly: BSOS630.

BSST631 Societal Impacts of and Responses to Terrorism (3 Credits)
Explores the manners in which a variety of different actors respond to both terrorist incidents and the threat of terrorism. Examines local responses to terrorist incidents; local impacts of terrorism including effects on individual and group attitudes and behaviors; policy decisions made in response to both terrorist attacks and the threat of terrorism; terrorism prevention, deterrence, interdiction, and mitigation efforts; and individual and community recovery from terrorist attacks.
Restriction: Must be in Terrorism Analysis Graduate Certificate Program; or permission of department.
Credit Only Granted for: BSOS631 or BSST631.
Formerly: BSOS631.

BSST632 Development of Counterterrorism Policies and Programs (3 Credits)
Addresses the formulation, adoption, effectiveness, impacts, and afterlives of counterterrorism policies and programs.
Restriction: Must be in the Terrorism Analysis Graduate Certificate Program; or permission of department.
Credit Only Granted for: BSOS632 or BSST632.
Formerly: BSOS632.

BSST633 Research Methods in Terrorism and Counterterrorism (3 Credits)
Provides students with the opportunity to conduct original research, while exposing them to analytical tools relevant to the study of terrorism. Students will work with a range of data sources on domestic and international terrorism, and will be tasked with using data to test hypotheses related to the causes, behaviors, and/ or impacts of terrorism.
Credit Only Granted for: BSOS633 or BSST633.
Formerly: BSOS633.

BSST634 Legal and Criminal Approaches to Counterterrorism (3 Credits)
The United States and many of her allies have challenged long-standing legal boundaries in their effort to combat terrorism. This course examines these responses, including: increased criminalization of terrorism related activities; aggressive criminal prosecutions; detention of suspected terrorists indefinitely in far-off prisons; implementation of enhanced interrogation techniques; launch of drones to kill alleged terrorists, even U.S. citizens; and deployment of a vast system of mass surveillance.
Restriction: Must be in the Graduate Certificate in Terrorism Analysis; or permission of instructor.

BSST635 Countering Violent Extremism: Policy and Practice (3 Credits)
In recent years, the understanding of how and why individuals engage in violent extremism and terrorism has evolved and become more nuanced, as have the tools to mitigate these threats. A field of policy and practice called Countering Violent Extremism (CVE) has emerged that focuses on countering the pull of terrorist recruitment and influence by building resilience among populations vulnerable to radicalization.

BSST636 Quantitative Research Methods in Terrorism Studies (3 Credits)
Introduction to probability, statistics and data analysis, particularly with respect to how they are used in the study of terrorism. Students will learn fundamental principles of probability and statistical inference, how to summarize data and make statistical inferences, and how to manipulate and analyze data in a statistical software package (Stata) that is widely used in the discipline. The course provides a foundation in quantitative analysis that will enable students to critically evaluate extant quantitative research and manipulate their own data. It will also prepare interested students for more advanced statistics training.
Restriction: Students must be in the Graduate Certificate in Terrorism Analysis program. All other students should contact education@start.umd.edu to obtain permission to register.

BSST637 Qualitative Research Methods in Terrorism Studies (3 Credits)
Explores research design and qualitative methods using a hands-on approach. The course considers general themes such as the logic of inquiry, the appropriateness of qualitative approaches, as well as more specific topics such as process tracing, archival research, and survey methodology. It also provides students with the opportunity to learn and apply different tools for social science research.
Restriction: Students must be in the Graduate Certificate in Terrorism Analysis program. All other students should contact education@start.umd.edu to obtain permission to register.

BSST638 Special Topics in Terrorism Studies (3 Credits)
A special topics course for students in the Global Terrorism Minor program. Topics that may be offered are Psychology of Terrorism; Development of Counterterrorism Policies and Programs; Terrorism and Popular Culture; Terrorism and the Media; International Perspective on Terrorism and Counterterrorism (Education Abroad); The Evolution of Hezbollah; Terrorism and Small Wars; Political Islam in the West.
Repeatable to: 9 credits if content differs.

BSST698 Seminar in Terrorism Studies (1-3 Credits)
A special topics seminar course for graduate students interested in terrorism studies.
Repeatable to: 9 credits if content differs.

BSST699 Independent Study in Terrorism Studies (3 Credits)
An independent study course for students in the Global Terrorism Minor program.
Repeatable to: 9 credits if content differs.

BUDT - Decision and Information Technologies

BUDT700 Business Communication (1 Credit)
Consists of written and oral base-line assessments. Students will meet with Program administrators to receive feedback on these assessments and create an individualized development plan. Workshops and core course assignments, Smith-related activities and CMP assignments.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith School of Business.
Credit Only Granted for: BUDT758A or BUDT700.
Formerly: BUDT758A.

BUDT703 Database Management Systems (3 Credits)
Introduction to the conceptual, logical and physical design of relational database systems and their use in business environments. Topics include information modeling and optimization via normalization; Structured Query Language (SQL); Data Warehousing.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith School of Business.
Credit Only Granted for: BUDT758Y OR BUDT703.
Formerly: BUDT758Y.

BUDT704 Data Processing and Analysis in Python (3 Credits)
An introduction to the Python programming language for the purpose of processing, analyzing, and visualizing data. In addition, students will be introduced to developing basic regression, optimization, and simulation models in Python, using highly popular packages. Course emphasis is on mastering basic Python functionality and developing intermediate to advanced skills in working with data, through instruction and active learning.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith School of Business.
Credit Only Granted for: BUDT758X OR BUDT704.
Formerly: BUDT758X.

BUDT706 Social Media and Web 2.0 (2 Credits)
Over the past years, social computing technologies such as online communities, blogs, wikis, and social networking systems have become important tools for individuals to seek information, socialize with others, get support, collaborate on work, and express themselves. Increasingly, businesses are trying to leverage web 2.0 by using social computing technologies to communicate with customers, employees, and other business partners or to build new business models. This course will review concepts and principles related to web 2.0 and examine issues and strategies associated with business use of social computing technologies.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUDT721 Digital Transformation in Business (2 Credits)
Introduces students to the strategic role of digital transformation within businesses, and provides an overview for how major information technologies may be used to inform and transform the firm's strategic, operational, and tactical decisions. Topics discussed in the course include the strategic use of digital technologies to generate sustainable competitive value; the contributions of new forms of technology infrastructure; the evaluation of new technology investments and the resulting ROI; acquiring, managing and governing technological capabilities within the firm; understanding the role of enterprise systems and social technologies within the firm; and the management of disruptive technologies within and outside the firm.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith School of Business.
Credit Only Granted for: BUDT758E or BUDT721.
Formerly: BUDT758E.

BUDT722 Managing Digital Business Markets (2 Credits)
The objective is to understand the strategic and tactical issues involved in managing digital businesses and markets. Also, some of the characteristics of digital businesses and markets that make them unique and understand how companies can best manage them will be examined.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith.
Credit Only Granted for: BUDT758G or BUDT722.
Formerly: BUDT758G.

BUDT723 Business Process Analysis for IS (3 Credits)
Helps students gain a solid foundation in the concepts, processes, tools, and techniques needed in analyzing business processes and conducting information systems projects.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith.
Credit Only Granted for: BUDT758N or BUDT723.
Formerly: BUDT758N.

BUDT730 Data Models and Decisions (3 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith.
Credit Only Granted for: BUSI758B, BUDT758Q or BUDT730.
Formerly: BUDT758Q.

BUDT732 Decision Analytics (3 Credits)
Analytical modeling for managerial decisions using a spreadsheet environment. Includes linear and nonlinear optimization models, decision making under uncertainty and simulation models.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith.
Credit Only Granted for: BMGT732, BUDT758P or BUDT732.
Formerly: BMGT732 and BUDT758P.

BUDT733 Data Mining and Predictive Analytics (2 Credits)
Data mining techniques and their use in business decision making. A hands-on course that provides an understanding of the key methods of data visualization, exploration, classification, prediction, time series forecasting, and clustering.
Prerequisite: BUSI630.
Credit Only Granted for: BMGT733 or BUDT733.
Formerly: BMGT733.

BUDT740 Management of Information Systems (3 Credits)
To work together effectively for an organization's success, both business managers and IS managers must understand how to both manage and utilize information systems. This course explores management issues and opportunities of the IS function within organizations. Topics include e-business, protection of intellectual property and personal information, software development, IS operations, systems availability and business continuity, IS for multinational organizations, shadow IS organizations, business partnerships and alliances, and mergers, acquisitions, and divestitures.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith.
Credit Only Granted for: BUDT758J or BUDT740.
Formerly: BUDT758J.

BUDT758 Special Topics in Decision, Operations and Information Technologies (1-4 Credits)
Selected advanced topics in the various fields of graduate study in decision, operations and information technologies.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BUDT759 Independent Study in Decision and Information Technologies (1-6 Credits)
Independent study for masters students in decision and information technologies.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUDT775 Pricing and Revenue Management (2 Credits)
Specialized course on pricing and revenue management (PRM) that provides students with tools and principles, drawn from several disciplines (Operations, Microeconomics, Decision Modeling, Statistics, Marketing, IS) to make effective pricing decisions. Topics covered include economics of pricing, strategy and tactics of PRM, pricing optimization, differentiated pricing, dynamic pricing, mark-down pricing, legal and ethical issues in models/methods used in making effective PRM decisions and managerial or organizational factors that hold the key to success in execution of PRM.
Prerequisite: BUSI630.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUDT758D or BUDT775.
Formerly: BUDT758D.

BUFN - Finance

BUFN602 Introduction to Financial Accounting (2 Credits)
Overview of financial accounting, periodic financial statements and the financial reporting process. Importance of financial statements as information source for creditors and investors and as a means by which managers can communicate information about their firms.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI610, BUAC602, BUFN602, or BMGT602.

BUFN610 Financial Management (2 Credits)
Focuses on the valuation of the real assets of firms as well as the valuation of stocks and bonds, the primary financial assets in an economy. While details vary, the conceptual foundations of valuation boil down to three themes: time value of money, no-arbitrage, and systematic risk.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUSI640, BUFN610, or BMGT610.

BUFN620 Capital Markets (2 Credits)
Designed to deepen the foundations necessary to finance focused students, especially those intending to specialize in the quantitative areas of finance including investments, fixed income, and financial engineering.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN740 or BUFN620.
Formerly: BUFN740.

BUFN630 Valuation in Corporate Finance (2 Credits)
An advanced topics course in Corporate Finance dealing with valuation. Main topics will be, building pro forma statements, cost of capital, using ratios and comparables to value projects and firms, dicounted cash flow valuations, WACC and APV methods of valuation and Real Option Valuations.
Prerequisite: BUFN610.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN630, BUFN714, BUFN750, BUFN753, or BMGT730.
Formerly: BUFN750.

BUFN640 Financial Data Analytics (2 Credits)
The course adopts a machine learning mindset to study standard techniques of econometric analysis of financial data. The focus is on understanding, interpretation, and practical applications in Python and Google Colab.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H.
Credit Only Granted for: BUFN758N of BUFN640.
Formerly: BUFN758N.

BUFN650 Machine Learning in Finance (2 Credits)
A hands-on course on applications of cutting-edge machine learning methods to financial modeling. It introduces students to a wide variety of machine learning techniques ranging from lasso regression to deep learning and TensorFlow.
Prerequisite: BUFN640.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H.
Credit Only Granted for: BUFN758O or BUFN650.
Formerly: BUFN758O.

BUFN660 Derivative Securities (2 Credits)
Standard types of derivatives contracts are presented, and illustrated as to how they are used in practice. The theory of pricing these contracts is then presented in detail. The use of static and dynamic replication strategies, and the concept of no-arbitrage strategies is illustrated in numerous ways. Standard valuation techniques are covered, and standard formulas are presented. The theory is then applied to develop specific pricing and hedging strategies for various types of derivatives on different underlying assets. The management of the exposure of various risks is covered in detail as well.
Prerequisite: BUFN610.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN660, BUFN726, BUFN761 or BUFN773.
Formerly: BUFN761.

BUFN670 Financial Mathematics (2 Credits)
Introduction to the mathematical models used in finance and economics with emphasis on pricing derivative instruments. Topics include elements from basic probability theory, distributions of stock returns, elementary stochastic calculus, Ito's Lemma, arbitrage pricing theory, and continuous time portfolio theory. Particular focus is on the financial applications of these mathematical concepts.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUFN710 Financial Strategy for Corporations (2 Credits)
An advanced course in corporate finance, focusing on the issues that firms face when they plan to raise external capital from financial markets. The focus is on the financing problems faced by mid-market to large firms and on capital raised from public markets. The forms of external finance vary from simple debt or equity to more complex securities that bundle with an element of risk management.
Prerequisite: BUFN610; or permission of BMGT-Robert H. Smith School of Business.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN751 or BUFN710.
Formerly: BUFN751.

BUFN712 Financial Restructuring (2 Credits)
Focuses on identifying ways to increase firm value through corporate restructuring. Specific topics include: mergers and tender offers, spin-offs, carve-outs, divestitures, takeover defense strategies, leveraged buy-outs, and international acquisitions. Additionally, the theory, practice and empirical evidence related to each of these topics will be covered. Emphasis will be placed on valuation analysis and strategic considerations.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN712 or BUFN752.
Formerly: BUFN752.

BUFN714 Corporate Governance and Performance (2 Credits)
Deals with corporate governance and its impact on shareholder value. Divergence of interests between corporate insiders and providers of funds leads to agency problems which can impair corporate performance and shareholder value. Various instruments of corporate governance - internal as well as external mechanisms - that can help align managerial incentives with those of outside investors, and hence help restore shareholder value will be studied.
Prerequisite: BUFN610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN630, BUFN714, BUFN750, BUFN753, or BMGT730.
Formerly: BUFN753.

BUFN716 Corporate Risk Management (2 Credits)
Surveys the theory and practice of financial risk identification, measurement, and mitigation at financial and non-financial firms. Topics will include hedging with options and futures, interest rate risk management, Value-at-Risk (VaR), Cashflow-at-Risk (CaR), Earnings-at-Risk (EaR), credit risk, equity risk, commodities risk, exchange rate risk, and lessons from risk management disasters.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN716 or BUFN754.
Formerly: BUFN754.

BUFN717 Entrepreneurial Finance and Private Equity (2 Credits)
An advanced topics course in Corporate Finance. The major emphasis is how financiers help growing firms - and in particular young start-ups - using different types of securities at different points in the industry's and firm's life. Financing arrangements and securities studied will include private equity funds and private financings placements, Venture Capital (VC) and preferred equity, Investment Banks through Initial Public Offerings (IPOs), Private equity finds, debt and leveraged buyouts. Students will learn additional techniques that will help them understand how financiers value firms and how to understand, plan and value different financing strategies.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN755 or BUFN717.
Formerly: BUFN755.

BUFN721 International Investment (2 Credits)
Addresses international stock markets, portfolio theory, international interest rates, exchange rates and exchange rate derivatives (options, forwards, and futures), exchange rate swaps and exchange rate exposure (operating, translation, and transaction), foreign investment strategy.
Prerequisite: BUFN610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN721 or BUFN770.
Formerly: BUFN770.

BUFN722 Banking and Financial Institutions (3 Credits)
The role of financial management in banking and financial institutions. The economic role and regulation of banking and financial institutions, analysis of risks and returns on financial assets and liabilities, and the structure of assets, liabilities and capital.
Prerequisite: BUSI640.
Credit Only Granted for: BUFN722, BUFN724, or BUFN772.

BUFN723 International Corporate and Project Finance (2 Credits)
Continuation of BUFN721. Issues addressed will include captial budgeting, project financing, exhange rate exposure (operating, translation, and transaction), foreign investment strategy, and risk management.
Prerequisite: BUFN610 and BUFN721.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN723 or BUFN771.
Formerly: BUFN771.

BUFN724 Bank Management (2 Credits)
Analyze and discuss readings in bank management,with primary focus on the measurement and management of risk, including credit, market, and interest rate risk. Look at the management of liquid reserves. Examine the special nature of financial institutions, incorporating their functions, policies, services, and regulation. Study the evolving nature of the financial services inductry, by reading the financial press and by having outside practitioner speakers. Focus is on U.S. banks.
Prerequisite: BUFN610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN724 or BUFN772.
Formerly: BUFN772.

BUFN726 Institutional Asset Management (2 Credits)
Examines how money is managed by organizations such as university endowments, pension funds, mutual funds, hedge funds, and private equity funds. Involves a mixture of finance and economics and emphasizes the incentives professional money managers face within the context of the organizational structure in which they operate. Particular attention is paid to compensation structures and monitoring mechanisms.
Prerequisite: BUFN610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN660, BUFN726, BUFN761 or BUFN773.
Formerly: BUFN773.

BUFN730 Advanced Financial Modeling and Equity Analysis (2 Credits)
Provides in-depth analysis of public equities, with a focus on financial statement analysis, financial forecasting and ultimately valuation. Students will apply the primary valuation techniques used in industry to estimate market values for equities. Additionally, students learn how to stress test their financial models and interpret outcomes.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN760 or BUFN730.
Formerly: BUFN760.

BUFN732 Fixed Income Analysis (2 Credits)
Describes important financial instruments which have market values that are sensitive to interest rate movements. Develops tools to analyze interest rate sensitivity and value fixed income securities. Defines and explains the vocabulary of the bond management business.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN732 or BUFN762.
Formerly: BUFN762.

BUFN734 Portfolio Management (2 Credits)
Provides training that is important in understanding the investment process - the buy side of the financial world. Specifically, the objective is to provide graduate-level instruction in the following topics, both in theory and in using financial markets data to test the basic theory and practice of portfolio choice and equilibrium pricing models and their implications for efficient portfolios.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN734 or BUFN763.
Formerly: BUFN763.

BUFN736 Quantitative Investment Strategies (2 Credits)
Provides an introduction to quantitative techniques of selecting equities, as used commonly among long-short equity hedge funds and other quantitative equity asset management companies. Statistical factor models are developed to locate stocks with higher expected returns, based on the observable characteristics of the stocks. Implementation issues, including statistical estimation, backtesting and portfolio construction, are covered, as is performance evaluation.
Prerequisite: BUFN610.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUFN764 or BUFN736.
Formerly: BUFN764.

BUFN738 Investment Fund Management (3 Credits)
Provides second-year Master in Business Administration students with the opportunity to apply the skills learned in finance classes to actual investment decisions through management of an investment fund.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Repeatable to: 9 credits.

BUFN740 Capital Markets (2 Credits)
Designed to deepen the foundations necessary to finance focused students, especially those intending to specialize in the quantitative areas of finance including investments, fixed income, and financial engineering.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN740 or BUFN620.

BUFN741 Advanced Capital Markets (2 Credits)
This course covers modern theories and techniques for investments and asset pricing. The main topics covered are: portfolio theory, pricing models, market efficiency, fixed income investment, forwards and futures, and options.
Prerequisite: BUFN620; or permission of BMGT-Robert H. Smith School of Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN758P or BUFN741.
Formerly: BUFN758P.

BUFN742 Financial Engineering (2 Credits)
Introduces and applies various computational techniques useful in the management of equity and fixed income portfolios and the valuation of financial derivatives and fixed income securities. Techniques include Monte Carlo Simulation and binomial/lattice pricing models. Emphasis is on bridging theory with the design of algorithms and models that can be directly applied in practice.
Prerequisite: BUFN610.
Restriction: Permission of BMGT-Robert H.
Credit Only Granted for: BUFN742 or BUFN766.
Formerly: BUFN766.

BUFN744 Fixed Income Derivatives (2 Credits)
Surveys fixed income assets and related securities such as Exchange-traded bond options; bonds with embedded options; floating rate notes; caps, collars, and floors; floating rate notes with embedded options. Also surveys advanced tools for interest-rate and fixed-income portfolio management, including the use of derivative securities, and the application of binomial trees for analysis of options, and a sound understanding of stochastic yield curves.
Prerequisite: BUFN610; and BUFN732.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN765 or BUFN744.
Formerly: BUFN765.

BUFN745 Financial Programming (2 Credits)
This course introduces basic and innovative statistical modelling methods for financial markets, and equips students with analytical and programming tools for modelling and analyzing financial data. Examples of applications include portfolio management and risk management.
Prerequisite: BUFN650.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN758E or BUFN745.
Formerly: BUFN758E.

BUFN746 Enterprise and Credit Risk Management (2 Credits)
Surveys the theory and practice of credit risk identification, measurement and mitigation along with understanding the principles of enterprise risk governance and risk-adjusted returns. The course examines how to develop credit loss distributions via Monte Carlo simulation or copula methodologies for consumer assets such as mortgages, credit cards and auto loans, developing commercial loan scorecards for rating credit risk. Pricing and use of various credit structures such as credit default swaps, collateralized debt obligations and credit-linked notes is examined.
Prerequisite: BUSI640; and BUFN740.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUFN747 Asset-Liability and Nonfinancial Risk Management (2 Credits)
This course surveys risks and techniques associated with asset-liability and nonfinancial risks including market and interest rate risk, liquidity risk, operational risk and model risk, among others. Techniques such as portfolio value-at-risk (VaR) are used in realistic empirical examples to illustrate the methods. Key rate duration, principal components analysis and analytical and simulation-based VaR techniques are used to estimate interest rate risk exposure for financial firms. Hedging these risks using various financial derivative products such as options, swaps and futures contracts is explored. Operational risk is estimated leveraging Poisson loss distributions and model risk and validation techniques are reviewed.
Prerequisite: BUSI640; and BUFN740.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUFN750 Valuation in Corporate Finance (2 Credits)
An advanced topics course in Corporate Finance dealing with valuation. Main topics will be, building pro forma statements, cost of capital, using ratios and comparables to value projects and firms, dicounted cash flow valuations, WACC and APV methods of valuation and Real Option Valuations.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN630, BUFN714, BUFN750, BUFN753, or BMGT730.
Formerly: BUFN714.

BUFN751 Financial Strategy For Corporations (2 Credits)
An advanced course in corporate finance, focusing on the issues that firms face when they plan to raise external capital from financial markets. The focus is on the financing problems faced by mid-market to large firms and on capital raised from public markets. The forms of external finance vary from simple debt or equity to more complex securities that bundle with an element of risk management.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN751 or BUFN710.

BUFN752 Financial Restructuring (2 Credits)
Focuses on identifying ways to increase firm value through corporate restructuring. Specific topics include: mergers and tender offers, spin-offs, carve-outs, divestitures, takeover defense strategies, leveraged buy-outs, and international acquisitions. Additionally, the theory, practice and empirical evidence related to each of these topics will be covered. Emphasis will be placed on valuation analysis and strategic considerations.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN712 or BUFN752.
Formerly: BUFN712.

BUFN753 Corporate Governance and Performance (2 Credits)
Deals with corporate governance and its impact on shareholder value. Divergence of interests between corporate insiders and providers of funds leads to agency problems which can impair corporate performance and shareholder value. Various instruments of corporate governance - internal as well as external mechanisms - that can help align managerial incentives with those of outside investors, and hence help restore shareholder value will be studied.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN630, BUFN714, BUFN750, BUFN753, or BMGT730.

BUFN754 Corporate Risk Management (2 Credits)
Surveys the theory and practice of financial risk identification, measurement, and mitigation at financial and non-financial firms. Topics will include hedging with options and futures, interest rate risk management, Value-at-Risk (VaR), Cashflow-at-Risk (CaR), Earnings-at-Risk (EaR), credit risk, equity risk, commodities risk, exchange rate risk, and lessons from risk management disasters.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN716 or BUFN754.

BUFN755 Entrepreneurial Finance and Private Equity (2 Credits)
An advanced topics course in Corporate Finance. The major emphasis is how financiers help growing firms - and in particular young start-ups - using different types of securities at different points in the industry's and firm's life. Financing arrangements and securities studied will include private equity funds and private financings placements, Venture Capital (VC) and preferred equity, Investment Banks through Initial Public Offerings (IPOs), Private equity finds, debt and leveraged buyouts. Students will learn additional techniques that will help them understand how financiers value firms and how to understand, plan and value different financing strategies.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN755 or BUFN717.

BUFN758 Special Topics in Finance (1-4 Credits)
Selected advanced topics in the various fields of graduate study in finance.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BUFN759 Independent Study in Finance (1-6 Credits)
Independent study for Masters students in finance.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUFN760 Applied Equity Analysis (2 Credits)
Students will learn to analyze equity securities using the basic EIC (Economy/Industry/Company) framework used in the financial industry, paying special attention to financial statement analysis. Students also will learn the primary valuation techniques used to estimate market values for equity securities.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN730 or BUFN760.

BUFN761 Derivative Securities (2 Credits)
Standard types of derivatives contracts are presented, and illustrated as to how they are used in practice. The theory of pricing these contracts is then presented in detail. The use of static and dynamic replication strategies, and the concept of no-arbitrage strategies is illustrated in numerous ways. Standard valuation techniques are covered, and standard formulas are presented. The theory is then applied to develop specific pricing and hedging strategies for various types of derivatives on different underlying assets. The management of the exposure of various risks is covered in detail as well.
Prerequisite: BUFN740.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN660, BUFN726, BUFN761 or BUFN773.
Formerly: BUFN726.

BUFN762 Fixed Income Analysis (2 Credits)
Describes important financial instruments which have market values that are sensitive to interest rate movements. Develops tools to analyze interest rate sensitivity and value fixed income securities. Defines and explains the vocabulary of the bond management business.
Prerequisite: BUFN740.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN732 or BUFN762.

BUFN763 Portfolio Management (2 Credits)
Provides training that is important in understanding the investment process - the buy side of the financial world. Specifically, the objective is to provide graduate-level instruction in the following topics, both in theory and in using financial markets data to test the basic theory and practice of portfolio choice and equilibrium pricing models and their implications for efficient portfolios.
Prerequisite: BUFN740.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN734 or BUFN763.

BUFN764 Quantitative Investment Strategy (2 Credits)
Provides an introduction to quantitative techniques of selecting equities, as used commonly among long-short equity hedge funds and other quantitative equity asset management companies. Statistical factor models are developed to locate stocks with higher expected returns, based on the observable characteristics of the stocks. Implementation issues, including statistical estimation, backtesting and portfolio construction, are covered, as is performance evaluation.
Prerequisite: BUFN763.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN764 or BUFN736.

BUFN765 Fixed Income Derivatives (2 Credits)
Surveys fixed income assets and related securities such as Exchange-traded bond options; bonds with embedded options; floating rate notes; caps, collars, and floors; floating rate notes with embedded options. Also surveys advanced tools for interest-rate and fixed-income portfolio management, including the use of derivative securities, and the application of binomial trees for analysis of options, and a sound understanding of stochastic yield curves.
Prerequisite: BUFN762.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN765 or BUFN744.

BUFN766 Financial Engineering (2 Credits)
Develop Excel and Visual Basic (VBA) models to solve problems related to portfolio management, options valuation, fixed income securities, interest rate processes, and risk management. This course thus bridges theory with the design of algorithms and models that can be directly applied in practice.
Prerequisite: BUFN740.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN742 or BUFN766.

BUFN768 Special Topics in Finance (1-4 Credits)
Selected experiential learning opportunities in advanced topics in the various fields of graduate study in finance.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.

BUFN770 International Investment (2 Credits)
Addresses international stock markets, portfolio theory, international interest rates, exchange rates and exchange rate derivatives (options, forwards, and futures), exchange rate swaps and exchange rate exposure (operating, translation, and transaction), foreign investment strategey.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN721 or BUFN770.

BUFN771 International Corporate and Project Finance (2 Credits)
Continuation of BUFN770. Issues addressed will include captial budgeting, project financing, exhange rate exposure (operating, translation, and transaction), foreign investment strategy, and risk management.
Prerequisite: BUFN770.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN724 or (BUFN770 and BUFN771).
Formerly: BUFN724.

BUFN772 Bank Management (2 Credits)
Analyze and discuss readings in bank management,with primary focus on the measurement and management of risk, including credit, market, and interest rate risk. Look at the management of liquid reserves. Examine the special nature of financial institutions, incorporating their functions, policies, services, and regulation. Study the evolving nature of the financial services inductry, by reading the financial press and by having outside practitioner speakers. Focus is on U.S. banks.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN722, BUFN724, or BUFN772.
Formerly: BUFN722.

BUFN773 Institutional Asset Management (2 Credits)
Examines how money is managed by organizations such as university endowments, pension funds, mutual funds, hedge funds, and private equity funds. Involves a mixture of finance and economics and emphasizes the incentives professional money managers face within the context of the organizational structure in which they operate. Particular attention is paid to compensation structures and monitoring mechanisms.
Prerequisite: BUSI640.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUFN660, BUFN726, BUFN761 or BUFN773.

BULM - Logistics, Business, and Public Policy

BULM700 Business Fundamentals for Supply Chain Managers I (2 Credits)
This course is part of a series of two courses Business Fundamentals for SCM part I and, part II. The series is intended to provide you with the knowledge and skills necessary to quantify the impact of supply chain management decisions on the bottom line. Students will gain a solid understanding of accounting, finance and the link between supply chain and overall financial performance. Students will analyze financial statements and explain the implications of supply chain management decisions on standard financial ratios and all components of the balance sheet and income statement. Through interactive supply chain finance models, students will demonstrate the sensitivity of outcome to multiple independent variables. Last but not least, students will also learn how to apply the net present value technique to evaluate the feasibility of investment projects in supply chain.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BULM758K or BULM700.
Formerly: BULM758K.

BULM701 Business Fundamentals for Supply Chain Managers II (2 Credits)
This is the second course of the series Business fundamentals for Supply Chain Managers. This course is intended to provide you with the knowledge and skills necessary to quantify the impact of supply chain management decisions on the bottom line. Students will gain a solid understanding of accounting, finance and the link between supply chain and overall financial performance. Students will analyze financial statements and explain the implications of supply chain management decisions on standard financial ratios and all components of the balance sheet and income statement. Through interactive supply chain finance models, students will demonstrate the sensitivity of outcome to multiple independent variables. Last but not least, students will also learn how to apply the net present value technique to evaluate the feasibility of investment projects in supply chain.
Prerequisite: BULM700; or permission of BMGT-Robert H. Smith School of Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM758Q or BULM701.
Formerly: BULM758Q.

BULM710 Data Driven Decision Making I (2 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI630, BULM758X or BULM710.
Formerly: BULM758X.

BULM711 Data Driven Decision Making II (2 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI630, BULM758Y or BULM711.
Formerly: BULM758Y.

BULM720 The Green Supply Chain (2 Credits)
In response to international regulation of carbon emissions and increasing corporate responsibility pressures, companies are seeking to develop greener supply chains. Companies such as WalMart have undergone a paradigm shift in how they manage their businesses to emphasize environmental stewardship and due diligence on product sustainability. Students are provided with key concepts and tools for designing and managing environmentally sustainable, low-impact supply chains.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BULM721 Global Supply Chain Management (2 Credits)
Offers a practical blueprint for understanding, building, implementing, and sustaining supply chains in today's rapidly changing global supply chain environment. It will provide the student with a survey of the fast-moving Supply Chain Management discipline and practice, including the evolution of supply chain strategies, business models and technologies; current best practices in demand and supply management; and methodologies for conducting supply chain-wide diagnostic assessments and formulating process improvement plans.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI672 or BULM721.

BULM724 Negotiations in Supply Chain Management (2 Credits)
This high experiential course will improve students' negotiation skills and capacity to acquire and effectively use power. By using a variety of assessment tools, feedback sources, skill-building exercises, and exercise debriefings, the class will increase students' negotiating self-confidence and improve their capacity to achieve win-win solutions to individual, team, and organizational problems. The course is designed to enhance students negotiating self confidence and improve students analytical skills, interpersonal skills, creativity (e.g., identifying creative solutions to conflict), and persuasive abilities.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BULM726 Purchasing Management (2 Credits)
Examines purchasing methods from both a tactical and straegic viewpoint. Special emphasis is placed on developing purchasing strategies from international suppliers and the trade-offs between outsourcing and insourcing.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BULM731 Technology Applications in Supply Chain Management (2 Credits)
In this course, we introduce the knowledge and skills necessary to quantify the impact of supply chain management decisions on the bottom line. Students will gain an understanding of accounting, finance, production cost, scheduling, and the link between supply chain and overall financial performance.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BULM732 Networks and Influence (2 Credits)
Focuses on networks, social capital, and influence as they relate to operating effectively in organizations. It draws heavily on emerging literature related to social capital and networks, but also integrates concepts from persuasion, communication, and motivation literatures to aid your efforts to build a successful track record for yourself and your organization.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO725 or BULM732.

BULM733 Global Trade Logistics (2 Credits)
Acquaints students with managerial issues in international logistics and transportation, and provides students with an understanding of issues related to import/export management and the global marketplace.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT773 or BULM733.
Formerly: BMGT773.

BULM734 Assessing and Managing Supply Chain Risks (3 Credits)
Supply chain managers are facing an increasingly volatile operating environment, with constant danger of trading community disruption from business, social and environmental risks. Students are provided with a working knowledge of both the core techniques of supply chain risk assessment and mitigation; as well as best practices in establishing formal corporate supply chain risk management programs. A semester-long X-Treme Supply Chain Simulation will enable students to gain hands-on experience in navigating a computer company through a complex and risky four quarters of global business operations.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BULM735 Project Management in Dynamic Environments (2 Credits)
Addresses project management skills that are required by successful managers in increasingly competitive and faster-moving environments. Examines fundamental concepts of successful project management, and the technical and managerial issues, methods, and techniques.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BULM736 Executives in Supply Chain Management (3 Credits)
Designed to provide students an opportunity to engage in intensive interaction with senior supply chain executives from a cross-section of industries. Executives share their insights on leading competitive supply chains in the global marketplace, while students research the competitive supply chain dynamics of each executive's industry.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BULM742 Global Supply Chain Resources Planning (2 Credits)
Provides students with an overall understanding of how firms use an advanced supply chain planning (ASCP) application as an integral part of their materials management process which includes such activities as production planning, materials requirements planning, and distribution requirements planning.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BULM744 Global Supply Chain Risk Management (2 Credits)
Explores methods to build enterprise resillience from the perspectives of the supply chain planner and supply chain manager. Addresses concerns assessing strategic & operational risks, day to day uncertainties in demand & supply and ensuring business continuity after low probability but high impact events such as a terrorist attack or earthquake.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; and permission of BMGT-Robert H. Smith School of Business.

BULM750 Lean Sigma for Supply Chain I (2 Credits)
This course is part of a series of courses. This the second part of the Lean Six Sigma for SC Managers course series. We will be focusing on the Analyze, Improve and Control phases of the Lean Six Sigma methodology. Lean Six Sigma is a robust methodology for problem solving aiming to improve quality and reduce speed within a process. This course covers up to the Lean and Six Sigma Green Belt level body of knowledge. You will be expected to conduct a project on a case study of a business looking to improve their processes to meet customer requirements.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM758L or BULM750.
Formerly: BULM758L.

BULM751 Lean Sigma for the Supply Chain II (2 Credits)
This course is part of a series of courses. The first part will cover the Introduction, Define and Measure Phases of the Lean Six Sigma Methodology. Lean Six Sigma is a robust methodology for problem solving aiming to improve quality and reduce speed within a process. This course covers up to the Lean and Six Sigma Green Belt level body of knowledge. You will be expected to conduct a project on a case study of a business looking to improve their processes to meet customer requirements.
Prerequisite: BULM750.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM758V or BULM751.
Formerly: BULM758V.

BULM754 Global Transportation Management (2 Credits)
Introduces transportation as a field of managerial and governmental responsibility and presents the features that make the transportation arena unique and, thus,worthy of advanced study. Each of the five modes of transportation, along with other forms of carriage, will be considered. In addition, the importance of freight transportation within supply chain management will be examined. Issues related to passenger transportation will also be addressed. Throughout the course, particular attention will be paid to the significant impact that transportation has on economic development and growth.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM758T or BULM754.
Formerly: BULM758T.

BULM756 Supply Chain Strategy (2 Credits)
Examines supply chain management at the strategic level. Through class lectures, case discussions, and assignments, students first learn about the determinants of corporate strategy. Supply chain strategies are then discussed, along with the need to properly align supply chain strategy with corporate strategy. Finally, there is a discussion of how to implement supply chain strategy, given various environmental and market considerations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM758B or BULM756.
Formerly: BULM758B.

BULM758 Special Topics in Logistics, Business and Public Policy (1-4 Credits)
Selected advanced topics in the various fields of graduate study in logistics, business and public policy.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BULM759 Independent Study in Logistics Management (1-6 Credits)
Independent study for Masters students in Logistics Management.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUMK - Marketing

BUMK701 Marketing Research Methods (2 Credits)
The process of acquiring, classifying and interpreting primary and secondary marketing data needed for intelligent, profitable marketing decisions. Evaluation of the appropriateness of alternative methodologies, such as the inductive, deductive, survey, observational, and experimental. Recent developments in the systematic recording and use of internal and external data needed for marketing decisions.
Prerequisite: BUSI650 and BUSI630.
Credit Only Granted for: BMGT752 or BUMK701.
Formerly: BMGT752.

BUMK706 Marketing Analysis (2 Credits)
Introduction to modeling tools used to support marketing analysis and decision making. Applications in strategic marketing, marketing segmentation, new product development, sales promotion analysis, pricing, design of marketing mix, sales force allocation, and direct marketing. Spreadsheet driven cases and illustrative readings.
Prerequisite: BUSI650.

BUMK715 Consumer Behavior (2 Credits)
Analysis of customer decision-making and how marketing strategy can be used to influence those decisions. The framework is a buyer behavior model, in which concepts from psychology, sociology, and economics are applied to individual and organizational purchase decisions. Marketing strategies of leading firms in consumer products, technology, and services (including internet services) are analyzed using a variety of case study formats. Focus is consumer behavior; however, principles can also be applied to the decision-making of business.
Prerequisite: BUSI650.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BMGT754 or BUMK715.
Formerly: BMGT754.

BUMK716 Brand Management (2 Credits)
Brand names are valuable assets for firms. Effective brand management is critical to maintaining the long-term profitability of products and services. Topics include understanding brands from the customer's perspective, building brand equity, measuring brand equity, leveraging brand equity, managing brand portfolios and managing brands over time.
Prerequisite: BUSI650.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BUMK717 Integrated Marketing Communications (2 Credits)
Marketing communications are a complex but critical component of marketing strategy. Topics include communication tools: advertising, sales promotions, corporation communications, one-on-one or direct marketing, public relations, internet communications, sponsorship/events marketing, and marketing communcation plans: defining objectives, implementing the plan, and measuring communications effectiveness. Achieving integration in the content, look, and feel of all marketing communications is stressed.
Prerequisite: BUSI650.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BUMK720 Marketing Strategy (3 Credits)
Introduces students to the fundamentals of marketing. This course combines lectures, readings, case analyses and a competitive simulation. A significant part of the course involves a competitive computer-based simulation in which student teams leverage marketing data and metrics to make marketing decisions for an organization that is competing in a market against other student teams in the class.
Restriction: Permission of BMGT-Robert H. Smith School of Business; or must be in Business and Management (Master's) program.
Credit Only Granted for: BUMK758B or BUMK720.
Formerly: BUMK758B.

BUMK722 Customer Equity Management (2 Credits)
Focuses on managing customers of a business, whether in B2B or B2C space, as a portfolio of equity; understanding the current and future value of customers to the business; selective acquisition, development, and retention of customers using latest developments in information technology.
Prerequisite: BUSI650.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUMK722 or BUMK750.

BUMK724 Customer Analysis (3 Credits)
Focuses on the analysis of customer decision-making and how marketing strategy can be used to influence those decisions. The framework used is the buyer behavior model, in which concepts from psychology, sociology, and economics are applied to individual and organizational purchase decisions. Marketing strategies of leading firms in consumer products, technology, and services (including internet services) are analyzed using a variety of case study formats.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758D or BUMK724.
Formerly: BUMK758D.

BUMK726 Statistical Programming for Customer Analytics (3 Credits)
Provides students with a foundation in probability and statistics with a focus on business applications. It also gives students a foundation for thinking in both likelihood and Bayesian frameworks. The course teaches students the basics of SAS, as well as its use in statistical analysis and statistical programming. Also addressed are basic SAS language structure, data management, OLAP, enterprise miner, statistical analysis, writing procedures.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758E or BUMK726.
Formerly: BUMK758E.

BUMK731 Business-to-Business Marketing (2 Credits)
Focus is large fraction of marketing activity directed at organizational customers (businesses, non-profits and government). Marketing strategies, tactics and analytical tools most relevant when marketing to organizational customers are covered. Readings, cases and term paper contribute to understanding how to build long term buyer/seller relationships. Course is appropriate for anyone interested in understanding relationships between organizations, including vertical strategic alliances.
Prerequisite: BUSI650.

BUMK736 Service Marketing and Management (2 Credits)
Examines special challenges service marketing poses for managers because of the intangible, heterogeneous nature of the product, and the critical role of customer contact employees in service delivery. Strategies for meeting these challanges are addressed. Topics include 1) customer relationship management, 2) the design and execution of the service delivery process, 3) the development and implementation of employee customer service skills, 4) the measurement and management of critical outcome variables, such as customer satisfaction, customer equity, and customer lifetime value, and 5) the role of emerging technology in customer service.

BUMK742 Advanced Marketing Analytics (3 Credits)
The analysis of marketing data needed for profitable marketing decisions. Advanced methods of marketing analysis for marketing decisions, including choice and count data models, joint analysis of consumers choice, quantity and timing decisions, mixture and mixture regression models, and conjoint analysis, all using data-based cases and SAS software. Applications are in the areas of strategic marketing, marketing segmentation, eye tracking for advertising effectiveness, new product development, sales promotion analysis, pricing, design of marketing mix, and direct marketing.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758K or BUMK742.
Formerly: BUMK758K.

BUMK744 Marketing Research and Analytics (3 Credits)
Provides a review of primary data collection methods for marketing data. Students will learn how to design and implement effective confirmatory research. Both direct methods such as surveys and indirect methods such as experiments will be covered. In this hands-on course, students will design and conduct research with target customers, analyze the data, and then present their results to decision makers.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758L or BUMK744.
Formerly: BUMK758L.

BUMK746 Data Science for Customer Analytics (3 Credits)
An introduction to data science and thebasic concepts of database management. The course also provides an overview of the various sources of in house data that are available to many organizations. Students will learn how to work with click stream, scanner panel and social media data. Geo-demographic datasets will be discussed and explored, and techniques for data-fusion will receive ample attention.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758W or BUMK746.
Formerly: BUMK758W.

BUMK747 CRM Analytics (2 Credits)
Customer Equity Management and Customer Relationship Marketing focuses on selective acquisition, development and retention of customers aided by developments in information technology and analytics - databases, online channels, social media, mobile technologies, and marketing analytics - with the objective of increasing a firm's customer equity (firm's value). This course will focus on the conceptual foundations of customer equity and relationship management, their strategic implications, and implementations in both B-2-B and B-2-C contexts, especially in the emerging era of big data. The course will provide insights into the role of measuring and managing customer equity and customer loyalty using online and offline media and channels. The objective of the course is to examine the strategic and analytical aspects in equal measure so that participants will have a deeper understanding of the power of customer equity and customer analytics, and how to put it to work effectively using data, big or small.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith.
Credit Only Granted for: BUMK758R or BUMK747.
Formerly: BUMK758R.

BUMK750 Customer Equity Management (2 Credits)
Managing customers of a business, whether in B2B or B2C space, as a portfolio of equity. Understanding the current and future value of customers to the business. Topics include selective acquisition, development, and retention of customers using latest developments in information technology.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK722 or BUMK750.

BUMK757 Marketing Strategy (2 Credits)
A capstone marketing course. Marketing strategies designed to manage products in selected market segments. Topics covered include competitor analysis, buyer analysis, market segments, and product strengths and weaknesses; product related issues are identified and marketing strategies developed, assessed and implemented.
Prerequisite: BUSI650.
Credit Only Granted for: BMGT757 or BUMK757.
Formerly: BMGT757.

BUMK758 Special Topics in Marketing (1-4 Credits)
Selected advanced topics in the various fields of graduate study in marketing.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits.
Formerly: BMGT798.

BUMK759 Independent Study in Marketing (1-6 Credits)
Independent study for Masters students in Marketing.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUMK760 Business Policies and Ethics (2 Credits)
The standards of business conduct, morals and values as well as the role of business in society. Students will consider the sometimes conflicting interests of and claims on the firm and its objectives.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758F or BUMK760.
Formerly: BUMK758F.

BUMK762 Business Communication I (1 Credit)
A study of the standards of business conduct, morals and values as well as the role of business in society. Students will consider the sometimes conflicting interests of and claims on the firm and its objectives.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758H or BUMK762.
Formerly: BUMK758H.

BUMK764 Business Communications II (1 Credit)
Teaches students how to communicate quantitative information effectively. Focuses on developing written, spoken and presentation skills.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758G or BUMK764.
Formerly: BUMK758G.

BUMK766 Digital Analytics (2 Credits)
Examines the process of developing, implementing and analyzing strategies for successfully marketing a variety of existing and potential products and services on the Internet. Special attention is devoted to the tools and techniques unique to the electronic media.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758N or BUMK766.
Formerly: BUMK758N.

BUMK770 Retail Analytics (2 Credits)
Planning and implementing retail marketing strategies often involve sophisticated analytics. This course will teach the analytical tools needed to develop retail strategies. Both store and non-store (catalog, Internet) retailing are discussed. Also, students will learn how to evaluate the impact of environmental trends in the consumer market, competition, the economy and technology on retail strategy in the U.S. and global market.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758M or BUMK770.
Formerly: BUMK758M.

BUMK772 Innovation Analytics (2 Credits)
The economic success of many firms depends on their ability to accurately identify needs of their customers andefficiently innovate -- i.e., develop new products, new services, or new processes -- in order to meet those needs.Achieving this goal is a multi-disciplinary initiative. In this course, we focus on key analytics driven decisions faced bymanagers when approaching this important task of innovation from the customer centric perspective of a marketer.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758Y or BUMK772.
Formerly: BUMK758Y.

BUMK773 Pricing Analytics and Strategies (2 Credits)
The economic and behavioral aspects of pricing and the evaluation of innovative pricing practices such as price matching, customized pricing, bundle pricing and product line pricing. The course will cover both B2B, B2C, online and offline markets. Instruction will be through a mix of case studies, pricing simulation games, hands-on exercises, practitioner guest lectures and discussions.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758J or BUMK773.
Formerly: BUMK758J.

BUMK774 Market Forecasting (2 Credits)
Market forecasting methods for different contexts. Focus on quantitative modeling techniques based on established statistical methods. Non-statistical methods used when empirical data is scarce. This is a very hands-on class where students will apply the forecasting methods learned to real data.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758A or BUMK774.
Formerly: BUMK758A.

BUMK776 Action Learning Project (2 Credits)
Students analyze marketing data, report their findings and provide appropriate recommendations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK758Q or BUMK776.
Formerly: BUMK758Q.

BUMO - Management and Organization

BUMO702 Managerial Staffing (3 Credits)
Aimed at increasing an understanding of the legal, technical, and practical issues involved in organizational staff forecasting, and hiring and termination procedures.
Credit Only Granted for: BMGT783 or BUMO702.
Formerly: BMGT783.

BUMO704 Problems and Applications in Human Resource Management (3 Credits)
Applications in the design, implementation, and evaluation of human resource management programs. Experiential learning activities and simulations.
Prerequisite: BUSI663.
Credit Only Granted for: BMGT761 or BUMO704.
Formerly: BMGT761.

BUMO714 Competitive and Collaborative Negotiation (2 Credits)
Increase negotiating self-confidence and improve capacity to achieve win-win solutions to organizational problems. Improve effectiveness at finding creative solutions to conflict.
Corequisite: BUMO715.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUMO714 or BMGT700.

BUMO715 Advanced Negotiation Challenges (2 Credits)
Practice negotiations using multiple media (email, phone). Multiple party negotiations. Cross-cultural negotiations.
Corequisite: BUMO714.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUMO720 Understanding Organizational Change (2 Credits)
Develops the fundamental change knowledge and skills of MBA students who plan to work with organizations as change agents, whether internally as managerial employees or externally as outside consultants. Draws on literatures from organizational behavior, human resource management and strategic management to identify models as prescriptions of change.
Prerequisite: BUSI664 or BUSI662.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUMO722 Organizational Behavior: A Multicultural Perspective (3 Credits)
Study of organizational behavior from a multicultural perspective.
Credit Only Granted for: BMGT765 or BUMO722.
Formerly: BMGT765.

BUMO725 Networks and Influence (2 Credits)
Focuses on networks, social capital, and influence as they relate to operating effectively in organizations. It draws heavily on emerging literature related to social capital and networks, but also integrates concepts from persuasion, communication, and motivation literatures to aid your efforts to build a successful track record for yourself and your organization.
Restriction: Must be in Business and Management (Master's) program.
Credit Only Granted for: BUMO725 or BULM732.

BUMO727 The Entrepreneur and the Entrepreneurial Team (3 Credits)
The entrepreneur and the entrepreneurial team: the entrepreneur and the team as it relates to innovation, change, power, and risk-taking. Entrepreneurs and their teams from a variety of different firms present and discuss their views on leadership.
Prerequisite: Completion of MBA core requirements; and permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT781 or BUMO727.
Formerly: BMGT781.

BUMO732 Entrepreneurship and New Ventures (2 Credits)
Provides an introduction to important tools and skills necessary to create and grow a successful new venture. Integrates research findings from a range of different practical and intellectual perspectives, including psychology, sociology, economics, strategic management, and history into practical, hands on lessons for an entrepreneur. Class projects provide the foundations for new, real businesses.
Credit Only Granted for: BUMO732 or BUSI660.
Formerly: BMGT780.

BUMO743 Technology Transfer Commercialization Strategies (3 Credits)
Viewing technology as a strategic resource of the firm, students develop an understanding of the processes, risks, and rewards of technology commercialization. Student teams are organized to review and select a technological innovation and then determine its commercial viability in the market place.
Restriction: Must be in Business and Management (Master's) program.
Credit Only Granted for: BMGT785 or BUMO743.
Formerly: BMGT785.

BUMO744 Creation of High Potential Ventures (3 Credits)
This course focuses on the real life experiences of high profile technology entrepreneurs. Guest entrepreneurs and book review reveal patterns of personal preparation, strategic decision-making, and action that have produced ventures with high value-added and significant regional and national impact.
Restriction: Must be in Business and Management (Master's) program.
Credit Only Granted for: BMGT787 or BUMO744.
Formerly: BMGT787.

BUMO748 Business Plan Review (3 Credits)
Evaluation of real business plans submitted to the Dingman Center for Entrepreneurship. Practicing venture capitalist and professors focus on business plan critique and writing skills, venture capitalist screening practices, and the structure of electronic commerce. Past business plan reviews are analyzed according to the business model, target market, competitive advantages/threats, stage of development, management team and financial status. Real investment decisions are made on the basis of student recommendations. Subject companies are contacted and evaluated.
Repeatable to: 6 credits.
Formerly: BMGT796.

BUMO751 Implementing Strategy: Organizing to Compete (2 Credits)
Organizational dynamics of competitive advantage. Impact of alternative organizational structures, planning and control systems, human resource management practices, and executive leadership styles on the implementation of archetypically different strategies.
Prerequisite: Must have completed or be concurrently enrolled in BUSI690. And must have completed MBA core requirements; or permission of BMGT-Robert H. Smith School of Business.

BUMO752 Strategic Growth for Emerging Companies (2 Credits)
Explores the key elements of mastering the move from being a successful small company to achieving industry significance. Supplemented by readings, video and guest speakers, the course highlights the application of practical lessons leading to strategic growth and subsequent emergence as a player.
Restriction: Must be in Business and Management (Master's) program.

BUMO753 Emerging Business Formation (2 Credits)
Business formation issues, legal obligations that affect entrepreneurial activities, the spectrum of financing methods available to emerging businesses, creating management and organization and a practical application of the tools through practical projects.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUMO754 Global Strategy (2 Credits)
Focuses on the "strategic" and "organizational" questions that a company must address as it globalizes its footprint. Among the questions that will be addressed are: What are the potential benefits, costs, and risks associated with going abroad? What differentiates a "global" from a "multidomestic" industry? What are the sources of competitive advantage in a global context?
Credit Only Granted for: BUSI674, BUMO754, or BMGT710.

BUMO756 Industry Analysis (2 Credits)
Conceptual framework and analytical tools for understanding the dynamics of industry structure. Impacts of past and future attractiveness of the industry on profitability. Developing and applying frameworks to devise competitive strategies in uncertain industries.
Recommended: BUSI690.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BMGT792 or BUMO756.
Formerly: BMGT792.

BUMO757 Competitor Analysis (2 Credits)
Understanding of the dynamics of how competitors interact in the marketplace. Understanding economic and behavioral motivations of industry players to design more effective strategies.
Recommended: BUSI690.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUMO758 Special Topics in Management and Organization (1-4 Credits)
Selected advanced topics in the various fields of graduate study in management and organization.
Restriction: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BUMO759 Independent Study in Management and Organization (1-6 Credits)
Independent study for Masters students in management and organization.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUMO761 Creativity for Business Leaders and Entrepreneurs (2 Credits)
Examines the concept of creativity as it applies in today's and tomorrow's complex business environment. An overview of the cognitive foundations of creativity, examines many of the preconceived notions about creativity in business and discusses multiple ways in which creativity can help business leaders and entrepreneurs to succeed. Topics include creativity techniques for groups and individuals, creativity as a foundation to recognize business opportunities and develop innovative products and services, selecting ideas and making them stick, mental and organizational obstacles to creativity as well as an overview of electronic tools to increase creative capability.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI661 or BUMO761.
Formerly: BUSI661.

BUMO767 Cross-Cultural Communication and Teamwork (2 Credits)
Provide managers a sound basis for developing such competencies. Specifically, we will develop an understanding of key cultural differences, and how these differences influence the management of individuals, groups, and organizations.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI667 or BUMO767.
Formerly: BUSI667.

BUMO794 Essentials of Negotiation (2 Credits)
This highly experiential course will improve students' negotiation skills and capacity to acquire and effectively use bargaining power. By using a variety of assessment tools, feedback sources, skill-building exercises, and exercise debriefings, the class will increase students' negotiating self-confidence and improve their capacity to claim value and achieve win-win solutions to individual, team, and organizational problems. The course is designed to enhance students' negotiating self-confidence and improve students' analytical and decision-making skills (e.g., understanding bargaining zones, knowing when an agreement can be made and when to walk away; learning how to prepare for negotiations), interpersonal skills, creativity (e.g., identifying creative solutions to conflict), and persuasive abilities.
Restriction: Must be in Business and Management (Master's) program.
Credit Only Granted for: BUMO794 or BUAC723.

BUMO796 Leadership and Human Resource Management for Accountants and Auditors (3 Credits)
Develops the concepts, frameworks, and skills that are important to be effective leaders and to successfully manage human resources. Topics for discussion include: Creating a motivating and empowering environment; leadership attributes, power and effective influence; building effective decision-making; strategic management of human resources; specification of the skills and competencies requisite for job success; recruiting and selecting employees to fit the job and the organization; measuring, appraising and improving performance. All of the topics selected for discussion are critical ones that every professional needs to know, regardless of functional area (not just HR professionals), and will help students become more effective consultants, managers and leaders.
Restriction: Must be in Business and Management (Master's) program.
Credit Only Granted for: BUMO796 or BUAC725.

BUSI - Part-Time MBA Program

BUSI600 Fundamentals of Business Decision Making (2 Credits)
Introduces students to the language of business. Topics covered include financial accounting, financial management, data models, strategy, leadership and teamwork, and a brief action learning project on innovation.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.
Additional Information: Pre-work includes the DISC assessment, and a requires a passing grade on a spreadsheet pre-work course.

BUSI604 Business Communication (2 Credits)
Develop the ability to communicate with and about data.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI608 ELM: Special Topics (0 Credits)
Selected advanced topics in the various fields of graduate study in business and management.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Formerly: BMGT608.

BUSI610 Introduction to Financial Accounting (2 Credits)
Overview of financial accounting, periodic financial statements and the financial reporting process. Importance of financial statements as information source for creditors and investors and as a means by which managers can communicate information about their firms.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI610, BUAC602, BUFN602, or BMGT602.

BUSI611 Managerial Accounting (2 Credits)
Use of accounting data in corporate planning and control. Cost-volume-profit analysis, budgeting, pricing decisions and cost data, transfer pricing, activity-based management, performance measures, and standard costing.
Prerequisite: BUSI610.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI611, BUAC616, or BMGT616.

BUSI621 Digital Transformation in Business (2 Credits)
Introduces students to the strategic role of digital transformation within businesses, and provides an overview for how major information technologies may be used to inform and transform the firm's strategic, operational, and tactical decisions. Topics discussed in the course include the strategic use of digital technologies to generate sustainable competitive value; the contributions of new forms of technology infrastructure; the evaluation of new technology investments and the resulting ROI; acquiring, managing and governing technological capabilities within the firm; understanding the role of enterprise systems and social technologies within the firm; and the management of disruptive technologies within and outside the firm.
Restriction: Must be in Business and Management (Master's); or permission of BMGT-Robert H Smith.
Credit Only Granted for: BUSI621 or BUSO620.

BUSI622 Managing Digital Business Markets (2 Credits)
The objective is to understand the strategic and tactical issues involved in managing digital businesses and markets. Also, some of the characteristics of digital businesses and markets that make them unique and understand how companies can best manage them will be examined.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BUSI630 Data Driven Decision Making (2 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUSI631 Data Driven Decision Making II (2 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI634 Operations Management (2 Credits)
Operations management is concerned with efficient and effective design and operation of business processes for delivering products and/or services. Emphasis is given to process analysis and design, capacity management and bottlenecks, waiting lines and the impact of uncertainty in process performance, quality management, lean, six-sigma, and revenue management.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI634 or BMGT624.

BUSI640 Corporate Finance (2 Credits)
Focuses on the valuation of the real assets of firms as well as the valuation of stocks and bonds, the primary financial assets in an economy. While details vary, the conceptual foundations of valuation boil down to three themes: time value of money, no-arbitrage, and systematic risk.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUSI641 Corporate Finance II (2 Credits)
Builds on the concepts and analytic methods covered in Corporate Finance I. Students will learn about the structure of financial markets, the financing and payout choices of large and small corporations, and the role of risk management in the corporation. In particular, the following issues will be addressed: The drivers of shareholder value; Corporate financing alternatives and the design of a company's capital structure; Coordinating investment, financing and payout policies; Corporate Finance Issues for Start-up firms; Key issues in international corporate finance.
Prerequisite: BUSI640.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI650 Marketing Management (2 Credits)
Analysis of marketing problems and evaluation of specific marketing efforts regarding the organization's products and services, pricing activities, channel selection, and promotion strategies in both domestic and international markets.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI650 or BMGT612.

BUSI662 Leadership and Teamwork (2 Credits)
Course examines concepts of team-building and leadership which are critical to managerial success. Topics include leadership, decision making, communication and conflict, work motivation, building effective teams, and organizational change and culture.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BMGT600, BUSI662, or BUSM600.

BUSI672 Global Supply Chain Management (2 Credits)
Offers a practical blueprint for understanding, building, implementing, and sustaining supply chains in today's rapidly changing global supply chain environment. It will provide the student with a survey of the fast-moving Supply Chain Management discipline and practice, including the evolution of supply chain strategies, business models and technologies; current best practices in demand and supply management; and methodologies for conducting supply chain-wide diagnostic assessments and formulating process improvement plans.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI672 or BMGT740.

BUSI673 International Economics for Managers (2 Credits)
Focuses on understanding critical aspects of the global business environment that influence firm decisions and behavior. Globalization is present in market competition, capital markets, and managerial talent as evidenced by free trade areas and economic unions forming, the volatility in global financial markets, and the continued rise of transnational firms. With globalization, the challenge for firms is to acknowledge, understand and act when appropriate - to act by sourcing, lobbying, and relocating value chain activities internationally.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUSI681 Managerial Economics and Public Policy (2 Credits)
Basic microeconomic principles used by firms, including supply and demand, elasticities, costs, productivity, pricing, market structure and competitive implications of alternative market structures. Market failures and government intervention. Public policy processes affecting business operations.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI681 or BMGT604.

BUSI683 The Global Economic Environment (2 Credits)
Relationship between national and international economic environments. Determinants of output, interest rates, prices and exchange rates. Analysis of effect of economic policies (fiscal, monetary, trade, tax) on the firm and the economy.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).

BUSI690 Strategic Management (2 Credits)
Analyze and identify profit opportunities and threats in different industry and competitive environments; Analyze and identify a firm's valuable assets, resources and capabilities and how they might be protected, leveraged, and extended in the market; Learn how to organize your company to be the best prepared to adapt its strategy over time as the market environment changes; and how to use organic growth as well as mergers, acquisitions, joint ventures, alliances, and divestitures to ensure that the firm maintians the proper scale and scope to compete effectively over time.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Credit Only Granted for: BUSI690 or BMGT614.

BUSI698 MBA Consulting Project (3-6 Credits)
Experiental research project in the identification of management problems, the evaluation of alternative solutions, and the recommendation for management.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)).
Repeatable to: 9 credits if content differs.
Formerly: BMGT698.

BUSI700 Financial Statement Analysis (2 Credits)
Provides students with the tools to conduct a financial statement analysis, which is part of an overall business analysis. This involves understanding and using the information that financial statements are communicating to users.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI702 Strategic Growth for Emerging Companies (2 Credits)
Explores the key elements of mastering the move from being a successful small company to achieving industry significance. Supplemented by readings, video and guest speakers, the course highlights the application of practical lessons leading to strategic growth and subsequent emergence as a player.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI710 Competitive and Collaborative Negotiation (2 Credits)
Increase negotiating self-confidence and improve capacity to achieve win-win solutions to organizational problems. Improve effectiveness at finding creative solutions to conflict.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI711 Industry Analysis (2 Credits)
Conceptual framework and analytical tools for understanding the dynamic of industry structure. Impacts of past and future attractiveness of the industry on profitability. Developing and applying frameworks to devise competitive strategies in uncertain industries.
Recommended: BUSI690.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI712 Entrepreneurship and New Ventures (2 Credits)
Provides an introduction to important tools and skills necessary to create and grow a successful new venture. Integrates research findings from a range of different practical and intellectual perspectives, including psychology, sociology, economics, strategic management, and history into practical, hands on lessons for an entrepreneur. Class projects provide the foundations for new, real businesses.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI713 Global Strategy (2 Credits)
Focuses on the "strategic" and "organizational" questions that a company must address as it globalizes its footprint. Among the questions that will be addressed are: What are the potential benefits, costs, and risks associated with going abroad? What differentiates a "global" from a "multidomestic" industry? What are the sources of competitive advantage in a global context?
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert , H. Smith School of Business.

BUSI714 Innovation Management (2 Credits)
Designed to give students a broad view on issues related to the management of innovations. Covers both external dynamics of innovations and internal management activities, with special emphasis on knowledge development and learning processes within organizations.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI718 Special Topics in Business (1-4 Credits)
Selected advanced topics in the various fields of graduate study in business.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 15 credits if content differs.

BUSI721 Creativity for Business Leaders and Entrepreneurs (2 Credits)
Examines the concept of creativity as it applies in today's and tomorrow's complex business environment. An overview of the cognitive foundations of creativity, examines many of the preconceived notions about creativity in business and discusses multiple ways in which creativity can help business leaders and entrepreneurs to succeed. Topics include creativity techniques for groups and individuals, creativity as a foundation to recognize business opportunities and develop innovative products and services, selecting ideas and making them stick, mental and organizational obstacles to creativity as well as an overview of electronic tools to increase creative capability.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI730 Marketing Research Methods (2 Credits)
The process of acquiring, classifying and interpreting primary and secondary marketing data needed for intelligent, profitable marketing decisions. Evaluation of the appropriateness of alternative methodologies, such as the inductive, deductive, survey, observational, and experimental. Recent developments in the systematic recording and use of internal and external data needed for marketing decisions.
Prerequisite: BUSI650 and BUSI630.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI731 Managing Brands and Products (2 Credits)
Brand names are valuable assets for firms. Effective brand management is critical to maintaining the long-term profitability of products and services. Topics include understanding brands from the customer's perspective, building brand equity, measuring brand equity, leveraging brand equity, managing brand portfolios and managing brands over time.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI732 Consumer Behavior (2 Credits)
Analysis of customer decision-making and how marketing strategy can be used to influence those decisions. The framework is a buyer behavior model, in which concepts from psychology, sociology, and economics are applied to individual and organizational purchase decisions. Marketing strategies of leading firms in consumer products, technology, and services (including internet services) are analyzed using a variety of case study formats. Focus is consumer behavior; however, principles can also be applied to the decision-making of business.
Prerequisite: BUSI650.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI734 Digital Marketing (2 Credits)
It has been a quarter century since the commercial use of the Internet and the World Wide Web began and during that time the business landscape has changed at a frenetic pace. Large multinational corporations such as Alphabet/Google, Facebook, Amazon, Alibaba and eBay, unheard of twenty years ago, have emerged as key players in our modern economy. In 2017 holiday season, online sales increased over 16 percent of overall spending online in 2016 with online retail spending in the U.S., the highest percentage since tracking began in 1999. Sales made through mobile devices have increased at a rapid rate to around 22 to 40 percent of all online sales. Corporations now highlight the importance of creating a digital relationship with customers. Moreover, digital technologies and devices such as smartphones, smart products, the Internet of Things, Artificial Intelligence, and deep learning all promise significant transformations of consumers lives in the near future. It is against this backdrop this course seeks to understand how the developments in digital technology are re-shaping the process and the strategy of marketing in the broad space we call digital marketing.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI735 Advanced Marketing Analytics (2 Credits)
Introduction to modeling tools used to support marketing analysis and decision making. Applications in strategic marketing, marketing segmentation, new product development, sales promotion analysis, pricing, design of marketing mix, sales force allocation, and direct marketing. Spreadsheet driven cases and illustrative readings.
Prerequisite: BUSI650.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI736 Pricing Strategies for Sustainable Competitive Advantage (2 Credits)
Pricing is one of the most important marketing decisions a firm faces. This course will help participants to develop pricing strategies using actual proven concepts, processes and techniques, to align pricing strategies with corporate goals and objectives, to determine the value customers assign to products and services using competitive pricing analysis, and to optimize pricing using customer segmenting strategies. The course will focus on both economic and behavioral aspects of pricing, and evaluation of innovative pricing practices such as price matching, customized pricing, bundle pricing and product line pricing, covering both B2B and B2C markets. Instruction will be through a mix of case studies, pricing simulation games, hands-on exercises and discussions. The course will provide participants with an in-depth understanding of state-of-the-art pricing strategies, practices and techniques for making profitable and sustainable pricing decisions.
Prerequisite: BUSI650.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI737 Innovation & Product Development (2 Credits)
Focuses on the development of innovations, new products or new services from the perspective of a marketer. For an innovation to be successful in the market, it has to be customer centric: hence, in this course, we study how to develop and bring to market elegant and efficient solutions to strong customer needs. This is a fundamental business challenge, faced while working in a startup or in an established company; when developing a new product or a new service; and when serving customers who are individuals or large corporations.
Prerequisite: BUSI650.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI740 Valuation in Corporate Finance (2 Credits)
An advanced topics course in Corporate Finance dealing with valuation. Main topics will be, building pro forma statements, cost of capital, using ratios and comparables to value projects and firms, discounted cash flow valuations, WACC and APV methods of valuation and Real Option Valuations.
Prerequisite: BUSI640.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI741 Financial Strategy for Corporations (2 Credits)
Advanced course in corporate finance, focusing on the issues that firms face when they plan to raise external capital from financial markets. The focus is on the financing problems faced by mid-market to large firms and on capital raised from public markets. The forms of external finance vary from simple debt or equity to more complex securities that bundle with an element of risk management.
Prerequisite: BUSI640.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI742 Entrepreneurial Finance and Private Equity (2 Credits)
Advanced course in Corporate Finance. The major emphasis is how financiers help growing firms - and in particular young start-ups - using different types of securities at different points in the industry's and firm's life. Financing arrangements and securities studied will include private equity funds and private financings placements, Venture Capital (VC) and preferred equity, Investment Banks through Initial Public Offerings (IPOs), Private equity finds, debt and leveraged buyouts. Students will learn additional techniques that will help them understand how financiers value firms and how to understand, plan and value different financing strategies.
Prerequisite: BUSI640.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI743 Applied Equity Analysis (2 Credits)
Students will learn to analyze equity securities using the basic EIC (Economy/Industry/Company) framework used in the financial industry, paying special attention to financial statement analysis. Students also will learn the primary valuation techniques used to estimate market values for equity securities.
Prerequisite: BUSI640.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI744 Derivative Securities (2 Credits)
Standard types of derivatives contracts are presented, and illustrated as to how they are used in practice. The theory of pricing these contracts is then presented in detail. The use of static and dynamic replication strategies, and the concept of no-arbitrage strategies is illustrated in numerous ways. Standard valuation techniques are covered, and standard formulas are presented. The theory is then applied to develop specific pricing and hedging strategies for various types of derivatives on different underlying assets. The management of the exposure of various risks is covered in detail as well.
Prerequisite: BUSI640.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI745 Fixed Income Analysis (2 Credits)
Describes important financial instruments which have market values that are sensitive to interest rate movements. Develops tools to analyze interest rate sensitivity and value fixed income securities. Defines and explains the vocabulary of the bond management business.
Prerequisite: BUSI640.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI746 International Investment (2 Credits)
Addresses international stock markets, portfolio theory, international interest rates, exchange rates and exchange rate derivatives (options, forwards, and futures), exchange rate swaps and exchange rate exposure (operating, translation, and transaction), foreign investment strategy.
Prerequisite: BUSI640.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI751 Decision Analytics (2 Credits)
Analytical modeling for managerial decisions using a spreadsheet environment. Includes linear and nonlinear optimization models, decision making under uncertainty and simulation models.
Prerequisite: BUSI630.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI752 Data Mining and Predictive Analytics (2 Credits)
Data mining techniques and their use in business decision making. A hands-on course that provides an understanding of the key methods of data visualization, exploration, classification, prediction, time series forecasting, and clustering.
Prerequisite: BUSI630.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI754 Social Media and Web Analytics (2 Credits)
Examines the process of developing, implementing, and analyzing strategies for successfully marketing a variety of existing and potential products and services using electronic media. Besides well-established Internet marketing tools such as e-mail, search engines and display advertising, a substantial part of the course is dedicated to understanding social media, analyzing successful social media strategies, and tracking their effectiveness. The course offers hands-on experience with many popular as well as emerging techniques unique to electronic media. Special attention is given to metrics appropriate for the new media.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI756 Managing Supply Chains: Models & Analysis (2 Credits)
Focuses on the strategic aspects of operations and supply chain management. Uses a framework for developing an operations strategy, and identify and analyze the key operations decisions which can have a major impact on a company's competitive position.
Prerequisite: BUSI630 and BUSI634.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI757 Pricing and Revenue Management (2 Credits)
Pricing is one of the most important and challenging business decisions with short-run and longrun implications. A specialized course on pricing and revenue management (PRM) is meant to provide you with the right bundle of tools and principles, drawn from several disciplines (Operations, Microeconomics, Decision Modeling, Statistics, Marketing, IS) to make effective pricing decisions. The topics covered in this course include economics of pricing, strategy and tactics of PRM, pricing optimization, differentiated pricing, dynamic pricing, using capacity controls in pricing, mark-down pricing, legal and ethical issues in pricing, B2B pricing, analysis of pricing processes, and applications of PRM in various industries. Emphasis is on both analytical models/methods used in making effective PRM decisions and managerial or organizational factors that hold the key to success in PRM.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI758 Special Topics in Business (1-4 Credits)
Selected advanced topics in the various fields of graduate study in business.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BUSI759 Independent Study in Business (1-6 Credits)
Independent study for Masters students in Business.
Repeatable to: 6 credits if content differs.
Formerly: BMGT708.

BUSI761 The Environment of International Business (2 Credits)
The international business environment as it affects company policy and procedures. In-depth analysis and comprehensive case studies of the business functions undertaken in international operations.
Credit Only Granted for: BMGT794 or BUSI761.
Formerly: BMGT794.

BUSI764 Business Law for Managers (2 Credits)
Survey of United States legal institutions and processes as well as substantive areas of the law that affect business. Examination of tort and contract law, the legal forms of business organization and legal liability and major regulatory laws that affect business.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI764 or BUAC721.

BUSI771 New Venture Financing (2 Credits)
Development of skills for financing new ventures (both small and potentially large). Exploration of various funding sources. Criteria used in evaluation and decision process, including commercial banks, venture capital companies, small business investment companies, underwriters, private placement-financial consultants, mortgage bankers, and small business innovative research grants (U.S. Government).
Prerequisite: BUSI640; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT740 or BUSI771.
Formerly: BMGT740.

BUSI781 Marketing Emergent Technology (1 Credit)
The many challenges and best practices of successfully marketing emergent technologies. The course will begin with a discussion of past successes and failures in marketing emergent technologies; followed by a study of the effective approaches and frameworks that help technology managers identify and understand customer needs. We will then focus on analyzing how the identified customer needs can guide design and development of emergent technologies. We will subsequently turn our attention to understanding how to translate customer needs and market conditions into effectively positioning our emergent technologies, with the intent of maximizing success when going to market.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith.

BUSI782 Science and Technology Project Valuation (2 Credits)
The application of financial management principles and techniques to science and technology investments and research and development projects. It will enable technology managers to estimate return on investment of R&D projects, value technology assets, quantify risk and make sound replacement and upgrade decisions for S&T projects. By the end of the course, students will be able to build financial models and make presentations to senior executives explaining the value creation potentially arising from investments in R&D, new product development, as well as infrastructure necessary to sustain the enterprise.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith School of Business.

BUSI784 Systems Design, Development, Test and Evaluation (2 Credits)
Systems engineering approaches to the definition, design, development, implementation, integration, verification, and validation of successful systems. Particular focus will be placed on the critical collaboration needed between business leaders and IT leaders in the early stages of program definition and how to effectively leverage and assess business-driven enterprise, product, and program development. The course will cover contemporary product lifecycle phases and the systems engineering technical processes associated with research and product development organizations in industry and government. It will explore currently popular development methodologies such as incremental, spiral, evolutionary, lean, and agile and how these are driven by concept and requirements development, systems analysis and modeling, and system architecting and are measured by technology prototyping, research validation, technology testing, and program/product evaluation. The intent is exposure to the systems engineering processes and product/program lifecycle is to help technology management professionals align developmental efforts to business/mission strategy; help them to oversee, collaborate with, and evaluate technology development efforts; and help them navigate challenges of technology development and adoption and advance technologies more efficiently from concept to operational use.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith School of Business.

BUSI785 Project Management in Dynamic Environments (2 Credits)
Addresses project management skills that are required by successful managers in increasingly competitive and faster-moving environments. Examines fundamental concepts of successful project management, and the technical and managerial issues, methods, and techniques.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BUSI786 Technology Management Capstone Action Learning Project (2 Credits)
This course will function as an experiential practicum to apply the skills and learning outcomes accumulated throughout the Technology Management curriculum toward solving real-world problems and cases. Projects will be chosen and executed in teams, and when possible sponsored by student employers or school partners. Project selection and maturation will receive iterative faculty facilitation.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith School of Business.

BUSI787 Integrative Capstone (2 Credits)
Provide students with an integrative experience to utilize the functional tools amassed in the MBA program and acquire new knowledge in the areas of international business, business ethics and executive/leadership presence, provide students with the opportunity to work with multiple functional areas at a time to drive business growth and utilize cases to address domestic and international challenges, enabling you to sharpen your skills in utilizing several methods for adding economic value when expanding globally. Additionally, students will raise awareness of best practices in building executive/leadership presence, as functional knowledge and business expertise is not enough to ensure successful career progression.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSI788 Introduction to Global Business Experience (1-2 Credits)
Introduction to the economic climate of the country and region, history, political influences on business landscape, and specific opportunities and threats of doing business in the destination country. Course is a prerequisite to short-term study abroad classes.
Restriction: Must be in a major in BMGT-Robert H. Smith School of Business.
Repeatable to: 2 credits.

BUSI790 Healthcare Operations Management and Marketing (3 Credits)
Introduction to a variety of tools that have been used to minimize waste and create value in the healthcare sector. These tools can also be applied to organizations outside of the healthcare sector. This course will focus on two critical aspects marketing in the context of hospitals and other health delivery organizations: service quality and customer relationship management. This course provides insight into the critical strategic decisions that healthcare managers must make as they seek to improve the performance of their organizations and attract and retain customers.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSI791 Research and Development Strategy and Process (2 Credits)
This course will educate technology management professionals on contemporary strategy, management approaches, and best-practices for research and development. The course will focus on private sector methods to manage technology programs, identify and specify technical requirements, communicate technology use and value, and assess new technologies and architectures. It will include instruction on technology scouting and assessing Technology Readiness Levels (TRLs). Through engagement with experts in creating and managing technology, students will also be exposed to human and behavioral factors that can influence technology adoption in the commercial and public sector.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H Smith School of Business.

BUSI792 Health Informatics and Information Technologies (3 Credits)
Targeted at professionals, managers, and consultants in healthcare to develop their understanding of core health informatics knowledge, IT concepts and management skills. Students will learn about policies, standards and methods of information exchange, data quality, cloud computing, behavior and population management, personal data collection devices, and how these elements can come together as parts of systems.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSI794 Current Topics in Healthcare Transformation (3 Credits)
Covers a range of topics selected to enhance students understanding of the current healthcare environment, strategic landscape, critical policy changes, and how to lead transformation in their organizations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSI796 Health Economics and Financing (3 Credits)
Designed to provide managers and professionals with a comprehensive overview of topics related to the economics and financial aspects of healthcare. Students will gain a perspective of how the healthcare ecosystem works from an economics perspective. The knowledge will be helpful for better economic analysis and business management in healthcare.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSI798 Global Business Experience (2-4 Credits)
Provides MBA students the opportunity to combine classroom learning and project research with seminars in a host country. The focus and locations visited will vary.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 6 credits if content differs.

BUSI799 Masters Thesis Research (1-6 Credits)

BUSM - Full-Time MBA Program

BUSM600 Leadership and Teamwork (2 Credits)
Course examines concepts of team-building and leadership which are critical to managerial success. Topics include leadership, decision making, communication and conflict, work motivation, building effective teams, and organizational change and culture.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BMGT600, BUSI662 or BUSM600.

BUSM602 Introduction to Financial Accounting (2 Credits)
Overview of financial accounting, periodic financial statements and the financial reporting process. Importance of financial statements as information source for creditors and investors and as a means by which managers can communicate information about their firms.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI610 or BUSM602.

BUSM604 Managerial Economics and Public Policy (2 Credits)
Basic microeconomic principles used by firms, including supply and demand, elasticities, costs, productivity, pricing, market structure and competitive implications of alternative market structures. Market failures and government intervention. Public policy processes affecting business operations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI681 or BUSM604.

BUSM606 Data Driven Decision Making (2-3 Credits)
Analytical modeling of business decisions; uncertainty, risk and expected utility; regression modeling to infer relationships among variables.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI630 or BUSM606.

BUSM610 Financial Management (2-3 Credits)
Focuses on the valuation of the real assets of firms as well as the valuation of stocks and bonds, the primary financial assets in an economy. While details vary, the conceptual foundations of valuation boil down to three themes: time value of money, no-arbitrage, and systematic risk.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI640 or BUSM610.

BUSM612 Marketing Management (2 Credits)
Analysis of marketing problems and evaluation of specific marketing efforts regarding the organization's products and services, pricing activities, channel selection, and promotion strategies in both domestic and international markets.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI650 or BUSM612.

BUSM614 Strategic Management (2 Credits)
Analyze and identify profit opportunities and threats in different industry and competitive environments; Analyze and identify a firm's valuable assets, resources and capabilities and how they might be protected, leveraged, and extended in the market; Learn how to organize your company to be the best prepared to adapt its strategy over time as the market environment changes; and how to use organic growth as well as mergers, acquisitions, joint ventures, alliances, and divestitures to ensure that the firm maintians the proper scale and scope to compete effectively over time.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI690 or BUSM614.

BUSM616 Managerial Accounting (2 Credits)
Use of accounting data in corporate planning and control. Cost-volume-profit analysis, budgeting, pricing decisions and cost data, transfer pricing, activity-based management, performance measures, and standard costing.
Prerequisite: BUSI610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI611 or BUSM616.

BUSM621 Strategic and Transformational IT (2 Credits)
Introduces students to the key issues in managing information technolog (IT) and provides an overview of how major IT applications in today's firms support strategic, opertaional, and tactical decisions. Topics include: synchroizing IT and business strategy; the transformational impacts of IT; evaluating and coping with new technologies; governing, managing, and organizing the IT function including outsourcing/ offshoring considerations; assessing the business value of IT and justifying IT projects; and managing IT applications in functional areas to support strategy and business process.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI621 or BUSM621.

BUSM622 Managing Digital Business Markets (2 Credits)
The objective is to understand the strategic and tactical issues involved in managing digital businesses and markets. Also, some of the characteristics of digital businesses and markets that make them unique and understand how companies can best manage them will be examined.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI622 or BUSM622.

BUSM624 Operations Management (2 Credits)
Operations management is concerned with efficient and effective design and operation of business processes for delivering products and/or services. Emphasis is given to process analysis and design, capacity management and bottlenecks, waiting lines and the impact of uncertainty in process performance, quality management, lean, six-sigma, and revenue management.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI634 or BUSM624.

BUSM626 The Global Economic Environment (2 Credits)
Relationship between national and international economic environments. Determinants of output, interest rates, prices and exchange rates. Analysis of effect of economic policies (fiscal, monetary, trade, tax) on the firm and the economy.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI683 or BUSM626.

BUSM701 Marketing Research Methods (2 Credits)
The process of acquiring, classifying and interpreting primary and secondary marketing data needed for intelligent, profitable marketing decisions. Evaluation of the appropriateness of alternative methodologies, such as the inductive, deductive, survey, observational, and experimental. Recent developments in the systematic recording and use of internal and external data needed for marketing decisions.
Prerequisite: BUSM606; and BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK701 or BUSM701.
Formerly: BUMK701.

BUSM702 Consumer Behavior (2 Credits)
Analysis of customer decision-making and how marketing strategy can be used to influence those decisions. The framework is a buyer behavior model, in which concepts from psychology, sociology, and economics are applied to individual and organizational purchase decisions. Marketing strategies of leading firms in consumer products, technology, and services (including internet services) are analyzed using a variety of case study formats. Focus is consumer behavior; however, principles can also be applied to the decision-making of business.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK715 or BUSM702.

BUSM703 Marketing Strategy (2 Credits)
A capstone marketing course. Marketing strategies designed to manage products in selected market segments. Topics covered include competitor analysis, buyer analysis, market segments, and product strengths and weaknesses; product related issues are identified and marketing strategies developed, assessed and implemented.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK757 or BUSM703.

BUSM704 New Product Development (2 Credits)
This course focuses on the development of innovations, new products or new services from the perspective of a marketer. For an innovation to be successful in the market, it has to be customer centric: hence, in this course, we study how to develop and bring to market elegant and efficient solutions to strong customer needs. This is a fundamental business challenge, faced while working in a startup or in an established company; when developing a new product or a new service; and when serving customers who are individuals or large corporations.
Prerequisite: BUSM612.
Restriction: Must be in one of the following programs (Business and Management (Master's); Business and Management (Master's)) ; or permission of BMGT-Robert H. Smith School of Business.

BUSM705 Brand Management (2 Credits)
Brand names are valuable assets for firms. Effective brand management is critical to maintaining the long-term profitability of products and services. Topics include understanding brands from the customer's perspective, building brand equity, measuring brand equity, leveraging brand equity, managing brand portfolios and managing brands over time.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK716 or BUSM705.

BUSM706 Innovation & Product Development (2 Credits)
Focuses on the development of innovations - new products or new services - from the perspective of a marketer. For an innovation to be successful in the market, it has to be customer-centric: hence, in this course, we study how to develop and bring to market elegant and efficient solutions to strong customer needs. This is a fundamental business challenge, faced while working in a startup or in an established company; when developing a new product or a new service; and when serving customers who are individuals or large corporations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO758P or BUSM706.

BUSM708 Independent Study in Business (1-6 Credits)
Independent study for Masters students in Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 6 credits if content differs.

BUSM710 Advanced Marketing Analytics Models (2 Credits)
Introduction to modeling tools used to support marketing analysis and decision making. Applications in strategic marketing, marketing segmentation, new product development, sales promotion analysis, pricing, design of marketing mix, sales force allocation, and direct marketing. Spreadsheet driven cases and illustrative readings.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK706 or BUSM705.

BUSM711 Pricing Strategies for Sustainable Competitive Advantage (2 Credits)
Pricing is one of the most important marketing decisions a firm faces. This course will help participants to develop pricing strategies using actual proven concepts, processes and techniques, to align pricing strategies with corporate goals and objectives, to determine the value customers assign to products and services using competitive pricing analysis, and to optimize pricing using customer segmenting strategies. The course will focus on both economic and behavioral aspects of pricing, and evaluation of innovative pricing practices such as price matching, customized pricing, bundle pricing and product line pricing, covering both B2B and B2C markets. Instruction will be through a mix of case studies, pricing simulation games, hands-on exercises and discussions. The course will provide participants with an in-depth understanding of state-of-the-art pricing strategies, practices and techniques for making profitable and sustainable pricing decisions.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM713 Market Forecasting (2 Credits)
Students will learn a number of market forecasting methods, each appropriate for different contexts. The majority of this course focuses on quantitative modeling techniques based on established statistical methods. We also cover non-statistical methods that are often used when empirical data is scarce. This is a very hands-on class where students will apply the forecasting methods learned to real data.
Prerequisite: BUSM606 and BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM714 Integrated Marketing Communications (2 Credits)
Marketing communications are a complex but critical component of marketing strategy. Topics include communication tools: advertising, sales promotions, corporation communications, one-on-one or direct marketing, public relations, internet communications, sponsorship/events marketing, and marketing communcation plans: defining objectives, implementing the plan, and measuring communications effectiveness. Achieving integration in the content, look, and feel of all marketing communications is stressed.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMK717 or BUSM707.

BUSM715 Digital Marketing (2 Credits)
It has been a quarter century since the commercial use of the Internet and the World Wide Web began and during that time the business landscape has changed at a frenetic pace. Large multinational corporations such as Alphabet/Google, Facebook, Amazon, Alibaba and eBay, unheard of twenty years ago, have emerged as key players in our modern economy. In 2017 holiday season, online sales increased over 16 percent of overall spending online in 2016 with online retail spending in the U.S., the highest percentage since tracking began in 1999. Sales made through mobile devices have increased at a rapid rate to around 22 to 40 percent of all online sales. Corporations now highlight the importance of creating a digital relationship with customers. Moreover, digital technologies and devices such as smartphones, smart products, the Internet of Things, Artificial Intelligence, and deep learning all promise significant transformations of consumers lives in the near future. It is against this backdrop this course seeks to understand how the developments in digital technology are re-shaping the process and the strategy of marketing in the broad space we call digital marketing.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSM716 Social Media and Internet Marketing (2 Credits)
Examines the process of developing, implementing, and analyzing strategies for successfully marketing a variety of existing and potential products and services using electronic media. Besides well-established Internet marketing tools such as e-mail, search engines and display advertising, a substantial part of the course is dedicated to understanding social media, analyzing successful social media strategies, and tracking their effectiveness. The course offers hands-on experience with many popular as well as emerging techniques unique to electronic media. Special attention is given to metrics appropriate for the new media.
Prerequisite: BUSM612.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM731 Capital Markets (2 Credits)
Designed to deepen the foundations necessary to finance focused students, especially those intending to specialize in the quantitative areas of finance including investments, fixed income, and financial engineering.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN740 or BUSM731.

BUSM733 Valuation in Corporate Finance (2 Credits)
An advanced topics course in Corporate Finance dealing with valuation. Main topics will be, building pro forma statements, cost of capital, using ratios and comparables to value projects and firms, dicounted cash flow valuations, WACC and APV methods of valuation and Real Option Valuations.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN750 or BUSM733.

BUSM735 Financial Strategy for Corporations (2 Credits)
An advanced course in corporate finance, focusing on the issues that firms face when they plan to raise external capital from financial markets. The focus is on the financing problems faced by mid-market to large firms and on capital raised from public markets. The forms of external finance vary from simple debt or equity to more complex securities that bundle with an element of risk management.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN751 or BUSM735.

BUSM736 Corporate Risk Management (2 Credits)
Surveys the theory and practice of financial risk identification, measurement, and mitigation at financial and non-financial firms. Topics will include hedging with options and futures, interest rate risk management, Value-at-Risk (VaR), Cashflow-at-Risk (CaR), Earnings-at-Risk (EaR), credit risk, equity risk, commodities risk, exchange rate risk, and lessons from risk management disasters.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN754 or BUSM736.

BUSM737 Applied Equity Analysis (2 Credits)
Students will learn to analyze equity securities using the basic EIC (Economy/Industry/Company) framework used in the financial industry, paying special attention to financial statement analysis. Students also will learn the primary valuation techniques used to estimate market values for equity securities.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN760 or BUSM737.

BUSM738 Investment Fund Management (1-4 Credits)
Provides second-year Master in Business Administration students with the opportunity to apply the skills learned in finance classes to actual investment decisions through management of an investment fund.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; and permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 12 credits.
Credit Only Granted for: BUFN738 or BUSM738.

BUSM741 Financial Restructuring (2 Credits)
Focuses on identifying ways to increase firm value through corporate restructuring. Specific topics include: mergers and tender offers, spin-offs, carve-outs, divestitures, takeover defense strategies, leveraged buy-outs, and international acquisitions. Additionally, the theory, practice and empirical evidence related to each of these topics will be covered. Emphasis will be placed on valuation analysis and strategic considerations.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN752 or BUSM741.

BUSM743 Entrepreneurial Finance and Private Equity (2 Credits)
An advanced topics course in Corporate Finance. The major emphasis is how financiers help growing firms - and in particular young start-ups - using different types of securities at different points in the industry's and firm's life. Financing arrangements and securities studied will include private equity funds and private financings placements, Venture Capital (VC) and preferred equity, Investment Banks through Initial Public Offerings (IPOs), Private equity finds, debt and leveraged buyouts. Students will learn additional techniques that will help them understand how financiers value firms and how to understand, plan and value different financing strategies.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN755 or BUSM743.

BUSM744 Portfolio Management (2 Credits)
Provides training that is important in understanding the investment process - the buy side of the financial world. Specifically, the objective is to provide graduate-level instruction in the following topics, both in theory and in using financial markets data to test the basic theory and practice of portfolio choice and equilibrium pricing models and their implications for efficient portfolios.
Prerequisite: BUSM610; and BUSM731.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUFN763 or BUSM744.

BUSM745 Derivative Securities (2 Credits)
Standard types of derivatives contracts are presented, and illustrated as to how they are used in practice. The theory of pricing these contracts is then presented in detail. The use of static and dynamic replication strategies, and the concept of no-arbitrage strategies is illustrated in numerous ways. Standard valuation techniques are covered, and standard formulas are presented. The theory is then applied to develop specific pricing and hedging strategies for various types of derivatives on different underlying assets. The management of the exposure of various risks is covered in detail as well.
Prerequisite: BUSM610.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSM747 Financial Reporting & Analysis (2 Credits)
Uses authoritative professional pronouncements to examine advanced financial reporting issues. Examines complex problems in accounting and reporting; examples include pensions, taxes, interest rate swaps, derivative securities, international transactions, and international financial reporting. Takes a user-oriented perspective, and examines the ways in which financial accounting information is used by investors, analysts, and creditors. Examples include if users adjust for alternative accounting methods or for information that is recognized versus disclosed.
Prerequisite: BUSM602.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM750 Project Management in Dynamic Environments (2 Credits)
Addresses project management skills that are required by successful managers in increasingly competitive and faster-moving environments. Examines fundamental concepts of successful project management, and the technical and managerial issues, methods, and techniques.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI785 or BUSM750.

BUSM751 Managing Supply Chains: Models & Analysis (2 Credits)
Focuses on the strategic aspects of operations and supply chain management. Uses a framework for developing an operations strategy, and identify and analyze the key operations decisions which can have a major impact on a company's competitive position.
Prerequisite: BUSM606 and BUSM624.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSM752 Games of Strategy and Incentives (4 Credits)
Analysis of managerial decisions in strategic environments using tools from game theory; competition and cooperation in product markets; principal-agent model and the economics of incentives; analytical foundations of behavioral constructs such as reputation, commitment and credibility.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business. Or BUSM610; and BUSM604; and BUSM614.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM754 Competitive and Collaborative Negotiation (2 Credits)
Increase negotiating self-confidence and improve capacity to achieve win-win solutions to organizational problems. Improve effectiveness at finding creative solutions to conflict.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO714 or BUSM754.

BUSM755 Organizational Change (2 Credits)
Develops the advanced knowledge and skills of MBA students who plan to work with organizations as change agents. Concrete and useful strategies, tools, and interventions for diagnosing organizational change situations, analyzing problems, and designing and implementing organizational change. Draws on literature from organizational behavior, human resource management and strategic management to identify models as prescriptions of change.
Prerequisite: BUSM600.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.

BUSM757 Implementing Strategy: Organizing to Compete (2 Credits)
Organizational dynamics of competitive advantage. Impact of alternative organizational structures, planning and control systems, human resource management practices, and executive leadership styles on the implementation of archetypically different strategies.
Prerequisite: BUSM614.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO751 or BUSM757.

BUSM758 Special Topics in Business (1-4 Credits)
Selected advanced topics in the various fields of graduate study in business.
Prerequisite: Permission of BMGT-Robert H. Smith School of Business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 9 credits if content differs.
Formerly: BMGT798.

BUSM761 Data Mining and Predictive Analytics (2 Credits)
Data mining techniques and their use in business decision making. A hands-on course that provides an understanding of the key methods of data visualization, exploration, classification, prediction, time series forecasting, and clustering.
Prerequisite: BUSM606.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUDT733 or BUSM761.
Formerly: BUDT733.

BUSM762 Decision Analytics (2 Credits)
Analytical modeling for managerial decisions using a spreadsheet environment. Includes linear and nonlinear optimization models, decision making under uncertainty and simulation models.
Prerequisite: BUSM606.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUDT732 or BUSM762.

BUSM764 Pricing and Revenue Management (2 Credits)
Specialized course on pricing and revenue management (PRM) that provide students with tools and principles, drawn from several disciplines (Operations, Microeconomics, Decision Modeling, Statistics, Marketing, IS) to make effective pricing decisions. Topics covered include economics of pricing, strategy and tactics of PRM, pricing optimization, differentiated pricing, dynamic pricing, mark-down pricing, legal and ethical issues in models/methods used in making effective PRM decisions and managerial or organizational factors that hold the key to success in execution of PRM.
Prerequisite: BUSM606; and BUSM624.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUDT775 or BUSM764.

BUSM765 Social Media and Web 2.0 (2 Credits)
Over the past years, social computing technologies such as online communities, blogs, wikis, and social networking systems have become important tools for individuals to seek information, socialize with others, get support, collaborate on work, and express themselves. Increasingly, businesses are trying to leverage web 2.0 by using social computing technologies to communicate with customers, employees, and other business partners or to build new business models. This course will review concepts and principles related to web 2.0 and examine issues and strategies associated with business use of social computing technologies.
Prerequisite: BUSM621; or BUSM622.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUDT706 or BUSM765.

BUSM767 Process Improvement (2 Credits)
Provide you with the necessary knowledge, tools and real-world examples to improve any organizational process and help students understand how a supply chain works from the perspective of processes improvement using Lean and, Six Sigma methods. Much of the focus will be on identifying where improvement opportunities reside, understanding and improving the flow of supply chain processes, and eliminating non-value activities using a wide arrange of tools.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSM771 Leading Strategically (2 Credits)
Focus on the aspects of the firm that facilitate reaching strategic objectives. The firm is comprised of formal structures or architecture, routines and practices, and culture and norms that all need to be well-aligned to support your strategy. In particular, organizational alignment facilitates the development of innovative ideas, achieving operational efficiency, sustaining organizational growth, adopting new business models, achieving strategic change, and building organizational competence. Students will use several tools to assist in analysis, such as congruence analysis, the 7S model, network analysis, and design thinking. Focus on thinking systematically and analytically about managing an organization and leading strategically.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSM773 Innovation & Entrepreneurship (2 Credits)
Provides an introduction to important tools and skills necessary to create and grow a successful new venture. Integrates research findings from a range of different practical and intellectual perspectives, including psychology, sociology, economics, strategic management, and history into practical, hands on lessons for an entrepreneur. Class projects provide the foundations for new, real businesses.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO732 or BUSM773.

BUSM775 Global Strategy (2 Credits)
Focuses on the "strategic" and "organizational" questions that a company must address as it globalizes its footprint. Among the questions that will be addressed are: What are the potential benefits, costs, and risks associated with going abroad? What differentiates a "global" from a "multidomestic" industry? What are the sources of competitive advantage in a global context?
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUMO754 or BUSM775.

BUSM778 Introduction to Global Business Experience (1-4 Credits)
Introduction to the economic climate of the country and region, history political influences on business landscape, and specific opportunities and threats of doing business in the destination country. Course is a prerequisite to short-term study abroad classes.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 4 credits.
Credit Only Granted for: BUSI788 or BUSM778.

BUSM781 International Economics for Managers (2 Credits)
Focus on understanding critical aspects of international economics that influence firm decisions and behavior. While covering theoretic fundamentals of international trade and foreign direct investment, focus on the implications for managers from these international economic activities. Such forces of globalization create winners and losers, and consider how firms can take advantage of these asymmetries. The topical issues include: - international trade: trade theory, comparative advantage, production location, why and how government is involved in international trade, how government involvement affects trade - firms participating abroad: determinants of foreign direct investment, location choice, off-shoring, emerging multinationals, emerging markets.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSM783 Global Supply Chain Management (2 Credits)
Offers a practical blueprint for understanding, building, implementing, and sustaining supply chains in today's rapidly changing global supply chain environment. It will provide the student with a survey of the fast-moving Supply Chain Management discipline and practice, including the evolution of supply chain strategies, business models and technologies; current best practices in demand and supply management; and methodologies for conducting supply chain-wide diagnostic assessments and formulating process improvement plans.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BUSI672 or BUSM783.

BUSM784 Assessing and Managing Supply Chain Risks (2 Credits)
Supply chain managers are facing an increasingly volatile operating environment, with constant danger of trading community disruption from business, social and environmental risks. Students are provided with a working knowledge of both the core techniques of supply chain risk assessment and mitigation; as well as best practices in establishing formal corporate supply chain risk management programs. A semester-long X-Treme Supply Chain Simulation will enable students to gain hands-on experience in navigating a computer company through a complex and risky four quarters of global business operations.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM734 or BUSM784.

BUSM785 Global Supply Chain Resources Planning (2 Credits)
Provides students with an overall understanding of how firms use an advanced supply chain planning (ASCP) application as an integral part of their materials management process which includes such activities as production planning, materials requirements planning, and distribution requirements planning.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Credit Only Granted for: BULM742 or BUSM785.

BUSM786 Global Trade Logistics (2 Credits)
Acquaints students with managerial issues in international logistics and transportation, and provides students with an understanding of issues related to import/export management and the global marketplace.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSM787 Supply Chain Management Experience (2 Credits)
Gain a hands-on experience with logistics and supply chain operations. Various supply chain management activities, ranging from transportation to warehousing, will be witnessed directly through a series of site visits and facility tours and explored in depth through directed company projects. Other supply chain management activities, such as purchasing and planning, will also be introduced throughout the semester.
Restriction: Must be in Business and Management (Master's) program OR Permission of BMGT-Robert H. Smith School of Business.

BUSM788 Global Business Experience (1-6 Credits)
Provides MBA students the opportunity to combine classroom learning and project research with seminars in a host country. The focus and locations visited will vary.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 8 credits if content differs.

BUSM798 Business Consulting (1-4 Credits)
Selected advanced topics in the various fields of graduate study in business.
Restriction: Must be in Business and Management (Master's) program; or permission of BMGT-Robert H. Smith School of Business.
Repeatable to: 8 credits if content differs.
Credit Only Granted for: BUSM798 or BMGT798.

CBMG - Cell Biology & Molecular Genetics

CBMG688 Special Topics in Cell Biology and Molecular Genetics (1-4 Credits)
Presentation and discussion of fundamental problems and special subjects in the topics of Cell Biology and Molecular Genetics.
Formerly: MICB688.

CBMG699 Special Problems in Cell Biology and Molecular Genetics (1-3 Credits)
Emphasis is placed on research and discussion of current problems in the area of Cell Biology and Molecular Genetics.
Repeatable to: 10 credits if content differs.
Formerly: PBIO699.

CBMG789 Seminar in Cell Biology and Molecular Genetics (2 Credits)
Cell Biology and Molecular Genetics Department Seminar.
Repeatable to: 4 credits if content differs.
Formerly: MICB789.

CBMG799 Masters Thesis Research (1-6 Credits)
Master's Thesis Research in Cell Biology and Molecular Genetics.

CBMG898 Pre-Candidacy Research (1-8 Credits)
Pre-candidacy Research.

CBMG899 Doctoral Dissertation Research (1-8 Credits)
Doctoral Dissertation Research.

CCJS - Criminology and Criminal Justice

CCJS418 Seminar in Criminology and Criminal Justice (3 Credits)
Selected topics of interest in the field of Criminology and Criminal Justice will be covered.
Repeatable to: 18 credits if content differs.

CCJS440 Security Administration (3 Credits)
Designed to introduce students to the complex issues of Security Administration and the critical terrorism issues facing the nation. Emphasis is placed on understanding the historical and contemporary issues effecting U.S. Counterterrorism Policy. It also explores the challenges facing today's security administrators including: ethics, classified information, intelligence, terrorist organizations and incidents, physical and personnel security, transportation and border security issues.
Prerequisite: CCJS100 and CCJS340.
Credit Only Granted for: CCJS440 or CCJS498Z.
Formerly: CCJS498Z.

CCJS444 Advanced Law Enforcement Administration (3 Credits)
The structuring of manpower, material, and systems to accomplish the major goals of social control. Personnel and systems management. Political controls and limitations on authority and jurisdiction.
Prerequisite: CCJS100 and CCJS340.

CCJS450 Advanced Juvenile Delinquency (3 Credits)
Examination of juvenile delinquency in the United States. Nature and extent of juvenile delinquency, historical approaches, sociological and criminological theories and research, social contexts including the institutions of families, schools, and peers, and social responses. Prevention, punishment, and treatment programs, both within and outside of the juvenile justice and criminal justice systems.
Prerequisite: CCJS105 and CCJS300.
Credit Only Granted for: CCJS350 or CCJS450.

CCJS451 Crime and Delinquency Prevention (3 Credits)
Methods and programs in prevention of crime and delinquency.
Prerequisite: CCJS105 and CCJS300.

CCJS452 Treatment of Criminals and Delinquents (3 Credits)
Processes and methods used to modify criminal and delinquent behavior.
Prerequisite: CCJS105 and CCJS300.
Credit Only Granted for: CCJS 342 or CCJS 452.

CCJS453 White Collar and Organized Crime (3 Credits)
Definition, detection, prosecution, sentencing and impact of white collar and organized crime. Special consideration given to the role of federal law and enforcement practices.
Prerequisite: CCJS300; and (CCJS350 or CCJS105).

CCJS454 Contemporary Criminological Theory (3 Credits)
Examination of the main theoretical accounts that explain the underlying causes of criminal behaviors. Explore how individual choices, socialization experiences, biological factors and social structure affect criminal behaviors.
Prerequisite: CCJS300 and CCJS105.

CCJS455 Dynamics of Planned Change in Criminal Justice I (3 Credits)
An examination of conceptual and practical issues related to planned change in criminal justice. Emphasis on the development of innovative ideas using a research and development approach to change.
Prerequisite: CCJS300.
Restriction: Permission of BSOS-Criminology & Criminal Justice department.

CCJS456 Dynamics of Planned Change in Criminal Justice II (3 Credits)
An examination of conceptual and practical issues related to planned change in criminal justice. Emphasis on change strategies and tactics which are appropriate for criminal justice personnel in entry level positions.
Prerequisite: CCJS455; or permission of BSOS-Criminology & Criminal Justice department.

CCJS458 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

CCJS461 Psychology of Criminal Behavior (3 Credits)
Biological, environmental, and personality factors which influence criminal behaviors. Biophysiology and crime, stress and crime, maladjustment patterns, psychoses, personality disorders, aggression and violent crime, sex-motivated crime and sexual deviations, alcohol and drug abuse, and criminal behavior.
Prerequisite: CCJS105 and CCJS300.

CCJS489 Honors Thesis Research (3 Credits)
Designed for students completing their honors thesis.
Prerequisite: CCJS100 and CCJS105.
Restriction: Limited to CCJS Departmental Honors students.

CCJS498 Selected Topics in Criminology and Criminal Justice (3 Credits)
Topics of special interest to advanced undergraduates in criminology and criminal justice. Offered in response to student request and faculty interest.
Repeatable to: 6 credits if content differs.

CCJS600 Criminal Justice (3 Credits)
Current concept of criminal justice in relationship to other concepts in the field. Historical perspective. Criminal justice and social control. Operational implications. Systemic aspects. Issues of evaluation.
Restriction: Must be in one of the following programs (Criminology and Criminal Justice (Master's); Criminology and Criminal Justice (Doctoral)) ; or permission of BSOS-Criminology & Criminal Justice department.
Formerly: CJUS600.

CCJS601 Policing (3 Credits)
An introduction to research, theory, and applications of the causes and consequences of police behavior. Community policing, problem-solving methods, police discretion, police misconduct, police crime prevention strategies, and restorative justice.

CCJS602 Courts and Sentencing (3 Credits)
Research and theory on prosecution, plea-bargaining, sentencing principles and guidelines, and sentencing policies in practice. Mandatory minimum sentencing, "three strikes" laws, race, gender and class disparities, general and specific deterrent effects of sentencing, restitution and restorative justice, diversion and sentencing to treatment.

CCJS604 Policy Analysis Project (3 Credits)
An application of statistical and conceptual tools to criminal justice data in the student's area of concentration, resulting in a paper reporting the conceptualization, analytic methods and results. The topic of the independent study will be chosen through individual consultation with the instructor.

CCJS605 Program Evaluation for Criminal Justice (3 Credits)
Designing, implementing and evaluating programs in criminal justice. Topics include diagnosing program needs, planning and tailoring evaluation programs, program monitoring, assessing program impact, program efficiency, and the social context of evaluation.
Credit Only Granted for: CCJS605 or CCJS609.
Formerly: CCJS609.

CCJS610 Research Methods in Criminal Justice and Criminology (3 Credits)
Examination of special research problems and techniques.
Formerly: CRIM610.

CCJS611 Statistical Tools for Criminal Justice (3 Credits)
An introduction to essential statistical concepts for analyzing crime and evaluating criminal justice policies. Interpreting crime trends and correlations, risk and conditional probability analysis for repeat offenders and hot spots of crime, time series analysis, experimental statistics, effect sizes, statistical power and significance.

CCJS613 Criminal Justice System in China (3 Credits)
The main contents of this course include: the overall characteristics of the Chinese judicial system, the horizontal comparison of the judicial system between China and the United States, the investigation system, the pre-trial detention system, the defense system, the prosecutorial system, the trial system, the sentencing system, the correction and community correction system, as well as the minor judicial system in the criminal justice system of China.
Restriction: Must be in the Criminology and Criminal Justice Professional Master's Program in Nanjing China.
Credit Only Granted for: CCJS678G or CCJS613.
Formerly: CCJS678G.

CCJS615 Criminal Procedure Law (3 Credits)
This course is intended to introduce students to basic issues in China's criminal procedure law.
Credit Only Granted for: CCJS678E or CCJS615.
Formerly: CCJS678E.

CCJS620 Fundamentals of Criminological Research (3 Credits)
Designed to help criminology students understand and apply three important components of statistics: decriptive statistics (including probability theory), fundamentals of statistical inference, and regression analysis. Course assumes familiarity with basic descriptive statistics. The emphasis of the classes on descriptive statistics is the calculation and interpretation of summary statistical measures for describing raw data. Covers the basic rules of probability and different probabilistic processes that could describe criminal activity. The sessions on fundamentals of statistical inferences are designed to provide background for executing and interpreting hypothesis tests and confidence intervals. The latter portion of the course focuses on regession analysis. Uses the statistical software, Stata.
Credit Only Granted for: CCJS498D or CCJS620.
Formerly: CCJS498D.

CCJS621 General Linear Models in Criminal Justice Research (3 Credits)
An in-depth exploration of applied linear regression analysis. Covers characteristics of estimates, such as unbiasedness and efficiency. Encourages fluency with the theoretical issues involved in the basic linear regression using simple algebra, familiarity with the general model using matrix algebra, and fluency with the computer application of multivariate regressions and the probit/logit models.
Prerequisite: CCJS620.
Credit Only Granted for: CCJS498F or CCJS621.
Formerly: CCJS498F.

CCJS633 Translating Research into Practice (3 Credits)
Law enforcement policy and practice is increasingly "evidence based." This course will focus on understanding data sources and the fundamentals of research methodology, focusing on how data and methodological choices shape the conclusions that can be drawn. At the end of this course, students will be able to discern between research of good and poor quality and understand the crucial benefits of evaluation.
Prerequisite: CCJS632.
Restriction: Permission of BSOS-Criminology & Criminal Justice department.

CCJS635 Minorities and Criminal Justice (3 Credits)
Role minorities play in the criminal justice system: as victims, offenders and professionals. Also provides theoretical framework for examining these roles.
Prerequisite: CCJS600; or students who have taken courses with comparable content may contact the department.

CCJS651 Seminar in Criminology (3 Credits)
Analysis of significant recent issues in Criminology.
Formerly: CRIM651.

CCJS652 Seminar in Juvenile Delinquency (3 Credits)
Analysis of delinquency and its control.
Formerly: CRIM652.

CCJS653 Seminar in Corrections (3 Credits)
Development, operation and future of correctional systems.
Prerequisite: CCJS651; or students who have taken courses with comparable content may contact the department.
Formerly: CRIM653.

CCJS654 History of Criminological Thought (3 Credits)
A study of the development of criminological thought from antiquity to the present.
Prerequisite: CCJS454; or students who have taken courses with comparable content may contact the department.
Formerly: CRIM654.

CCJS660 Gender and Crime (3 Credits)
Assumptions, biases, and relative strengths and weaknesses of theories of crime as applied to women. Criminal justice sanctioning of crimes by and against women. The course will also explore occupational segregationby gender in criminal justice professions, particularly in the fields ofpolicing, courts (attorneys and judges), and corrections (correctionalofficers and treatment staff).

CCJS661 Crime and the Life Course (3 Credits)
Designed to provide an intensive examination of crime and the life course. Life course is examined as a theoretical orientation, a research methodology, and an empirical field of study with special reference to crime and deviance. Course includes development of criminal behavior and criminal careers; stability and change in criminal behavior across developmental stages; trajectories, transitions, and turning points through life; quantitative and qualitative approaches to studying crime and the life course; and social change and its link to individual lives.
Credit Only Granted for: CCJS699J or CCJS661.
Formerly: CCJS699J.

CCJS663 Issues in Corporate Crime (3 Credits)
Overview of what is known about corporate crime and criminals (e.g.: similarities to and differences from other offenders and crime types; characteristics of offenders and victims; what counts as corporate crime ; introduction to theoretical frameworks.) Readings and class materials will coalesce around specific issues about which there is much debate but scant empirical research. Discussions will center around what is known, what is not, what needs to be done and how.
Credit Only Granted for: CCJS699S or CCJS663.
Formerly: CCJS699S.

CCJS664 Regulating Vice and Regulating Organized Crime (3 Credits)
For this course, vice is defined as a habit with bad consequences that can generate large black markets if the market for supplying that habit is prohibited or heavily regulated. Vice if found in all modern societies, though in widely differing forms, depending on population characteristics, culture and law. Society's decision is how to regulate it, whether criminally or otherwise, and how then to assess whether the regulation is successful. This assessment has multiple components, including: choosing outcome measures; modeling counterfactuals for which the evidence is often very indirect and developing a framework for ensuring that comparisons reflect all relevant outcomes and values.
Credit Only Granted for: CCJS699V or CCJS664.
Formerly: CCJS699V.

CCJS667 Innovations in Policing: Programs, Policies and Research (3 Credits)
Examine the factors that have led to recent police innovations and recent innovations in the study of policing. Critically explores the effects of such policies on crime and disorder, on research practices, as well as unintended consequences on community, police abuse and police organization. Which policies have been found to be effective? What types of practices work most effectively for what type of crime and disorder problems? Has there been sufficient research for us to come to solid conclusions regarding these questions? Does present research fit the practices of the police?
Credit Only Granted for: CCJS667 or CCJS699W.
Formerly: CCJS699W.

CCJS670 Race, Crime, and Criminal Justice (3 Credits)
Provides an historical overview of the operation and evolution of the criminal justice system and the impact of race. How race affects definitions of crime and criminality, the workings of the criminal justice system, the development of criminological theory, and the role of criminal justice ethics in the study of race and crime will be considered.

CCJS678 Advanced Topics in Criminology and Criminal Justice (3 Credits)
An analysis of contemporary issues in criminology and criminal justice with special emphasis on research and theory developments.
Prerequisite: CCJS600.
Repeatable to: 12 credits if content differs.

CCJS680 Drugs and Crime (3 Credits)
The relationship between drug use and crime. Policy concerning drug control enforcement, prosecution and sentencing. impact of drug treatment in criminal justice Impact of drug treatment in criminal justice settings, drug courts, drug-testing strategies and surveillance of former drug abusers in the community.

CCJS699 Special Criminological Problems (1-3 Credits)
Supervised study of a selected problem in the field of criminal justice.
Restriction: Permission of BSOS-Criminology & Criminal Justice department.
Repeatable to: 6 credits.
Formerly: CJUS699.

CCJS700 Advanced Research Methods in Criminology and Criminal Justice (3 Credits)
An in-depth inventory of the methods of criminological research. It considers the philosophy of science and research ethics; discusses sampling, measurement and methods of data collection, including survey, experimental, evaluation, and qualitative research.
Prerequisite: CCJS610.

CCJS710 Advanced Statistics Methods - Limited Dependent Variables (3 Credits)
Application of advanced data analysis strategies to criminological and criminal justice problems, with specific focus on limited dependent variables.
Prerequisite: Must have completed an approved doctoral level statistics course.
Formerly: CRIM710.

CCJS711 Randomized Experiments in Criminology and Criminal Justice (3 Credits)
Constrast randomized designs with other approaches, examining both statistical, methodological, ethical and practical concerns. What are the statistical advantages of randomized experimental designs? Why do some researchers believe that randomized studies violate ethical standards in criminal justice? Why are experiments considered to have higher internal validity than non-randomized designs and how do different types of designs compare in terms of external validity? Focus on how experiments can be developed and how they are analyzed. What are the practical barriers to experimentation and how can they be overcome? What statistical methods are most appropriate for experimental analysis? How can block randomization or hierarchical modeling be used to develop more powerful or more practical research approaches?

CCJS712 Longitudinal Data Analysis with Latent Variables (3 Credits)
This course is designed for graduate students with an interest in the use of latent variables in longitudinal data analysis as it is conceptualized in the Mplus framework. This course explores more general features of latent variable analyses as they are related to longitudinal modeling. Topics to be covered include latent growth analysis with a combination of continuous and categorical latent variables as well as the inclusion of continuous and categorical variables as predictors and outcomes.
Credit Only Granted for: CCJS699F or CCJS712.
Formerly: CCJS699F.

CCJS720 Criminal Justice System Planning: Policy Analysis for Crime Control (3 Credits)
System theory and method; examination of planning methods and models based primarily on a systems approach to the operations of the criminal justice system.
Prerequisite: Must have completed 1 course in research methodology; and 1 course in CCJS.
Formerly: CJUS720.

CCJS799 Master's Thesis Research (1-6 Credits)
Formerly: CRIM799.

CCJS898 Pre-Candidacy Research (1-8 Credits)

CCJS899 Doctoral Dissertation Research (1-8 Credits)
Doctoral dissertation research in criminal justice and criminology.
Formerly: CRIM899.

CHBE - Chemical and Biomolecular Engineering

CHBE409 Undergraduate Honors Seminar (1 Credit)
Students will attend and write summaries of departmental seminars, along with professional development activities
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and Permission of ENGR-Chemical & Biomolecular Engineering department; and Must be in the Chemical Engineering Honors Program.
Repeatable to: 2 credits.

CHBE410 Statistics and Design of Experiments (3 Credits)
An introduction to probability, statistics, and design of experiments for chemical engineers.
Prerequisite: Minimum grade of C- in CHBE250, MATH241, and MATH246.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE410 or ENCH476.
Formerly: ENCH476.

CHBE422 Chemical and Biomolecular Engineering Transport Phenomena I (3 Credits)
Principals of fluid dynamics as applied to model development and process design. Mass, momentum and energy conservation. Statics and surface tension. Equation of Continuity and Navier-Stokes Equation with application to laminar flow. Dimensional analysis. Macroscopic balances, Bernoulli Equation and friction factors with application to turbulent flow.
Prerequisite: Minimum grade of C- in CHBE101, CHBE250, MATH241, and MATH246.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE422 or ENCH422.
Formerly: ENCH422.

CHBE424 Chemical and Biomolecular Engineering Transport Phenomena II (3 Credits)
Principles of mass and heat transfer as applied to model development and process design. Species continuity equation with application to diffusion, and convection in laminar flow. Macroscopic balances and mass transfer coefficients with application to turbulent flow. Microscopic equation of energy with application to heat conduction, and convection in laminar flow. Macroscopic energy balance and heat transfer coefficients with application to turbulent flow. Heat exchanger design.
Prerequisite: CHBE422.
Corequisite: CHBE302.
Restriction: Must be in Engineering: Chemical program; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE424 or ENCH424.
Formerly: ENCH424.

CHBE426 Chemical and Biomolecular Separation Processes (3 Credits)
Separation by stages operations. Rate dependent separation processes. Design application in distillation, gas absorption, liquid extraction, drying, adsorption and ion exhange.
Corequisite: CHBE302; and CHBE424.
Restriction: Must be in Engineering: Chemical program; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE426 or ENCH426.
Formerly: ENCH426.

CHBE437 Chemical and Biomolecular Engineering Laboratory (3 Credits)
Application of chemical engineering process and unit operation principals in small-scale semi-commercial equipment. Data from experimental observations are used to evaluate performance and efficiency of operations. Emphasis on correct presentation of results inreport form.
Prerequisite: CHBE424, CHBE426, and CHBE440.
Restriction: Must be in a major within ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE437 or ENCH437.
Formerly: ENCH437.

CHBE440 Chemical Kinetics and Reactor Design (3 Credits)
Fundamentals of chemical reaction kinetics and their application to the design and operation of chemical reactors. Reaction rate theory, homogeneous reactions and catalysis electrochemical reactions. Catalytic reactor design.
Prerequisite: Minimum grade of C- in CHBE301, MATH241, and MATH246.
Restriction: Must be in Engineering: Chemical program; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE440 or ENCH440.
Formerly: ENCH440.

CHBE442 Chemical and Biomolecular Systems Analysis (3 Credits)
Dynamic response applied to process systems. Goals and modes of control, Laplace transformations, analysis and synthesis of simple control systems, closed loop response, dynamic testing.
Prerequisite: CHBE424 and CHBE426.
Credit Only Granted for: CHBE442 or ENCH442.
Formerly: ENCH442.

CHBE444 Process Engineering Economics and Design I (3 Credits)
Principles of chemical engineering economics and process design. Equipment sizing and costing. Economic evaluation of projects. Flowsheet synthesis. Introduction to flowsheet simulators and concepts of flowsheet optimization. Synthesis of Heat Exchanger Networks and Distillation Sequences.
Prerequisite: CHBE424, CHBE426, and CHBE440.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE444 or ENCH444.
Formerly: ENCH444.

CHBE446 Process Engineering Economics and Design II (3 Credits)
Application of chemical engineering principles for the design of chemical processing equipment. Representative problems in the design of chemical plants will be the focus of this capstone design class. Comprehensive reports are required.
Prerequisite: CHBE442 and CHBE444.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE446 or ENCH446.
Formerly: ENCH446.

CHBE451 Photovoltaics: Solar Energy (3 Credits)
The emphasis of the class is on developing a conceptual understanding of the device physics and manufacturing processes of crystalline and thin-film photovoltaic cells, and to develop elementary computational skills necessary to quantify solar cell efficiency. The class material includes detailed, system-level energy balances necessary to understand how solar energy fits into the complete energy generation, conversion, and storage picture. Quantitative comparisons of PV technology to solar chemical conversion processes and biofuels are made.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH468L or CHBE451.
Formerly: ENCH468L.

CHBE453 Applied Mathematics and Distributive Parameter Systems (3 Credits)
Mathematical techniques applied to the analysis and solution of chemical engineering problems. Use of differentiation, integration, differential equations, partial differential equations and integral transforms. Application of infinite series, numerical and statistical methods.
Credit Only Granted for: CHBE453 or ENCH453.
Formerly: ENCH453.

CHBE454 Chemical Process Analysis and Optimization (3 Credits)
Application of mathematical models to the analysis and optimization of chemical processes. Models based on transport, chemical kinetics and other chemical engineering principles will be employed.
Credit Only Granted for: CHBE454 or ENCH454.
Formerly: ENCH454.

CHBE455 Model Predictive Control (3 Credits)
Empirical model identification from process data. Step and impulse response models. Linearization of nonlinear first principles models. Single variable Model Predictive Control. Robustness with respect to modeling error. MPC based tuning of PID controllers. Feedforward control. Multi-input multi-output processes. Multi-loop decentralized control. Centralized multivariable Model Predictive Control via on-line optimization.
Credit Only Granted for: CHBE455 or ENCH455.
Formerly: ENCH455.

CHBE457 Design and Processing of Polymers for Biomedical Devices (3 Credits)
An overview of the design and processing of polymers used in medical applications. Following a discussion of the physical and mechanical properties of polymers, important classes of polymeric biomaterials will be surveyed, discussing material synthesis, processing techniques and equipment, as well as properties and performance in biomedical applications. Topics will include silicone elastomers, hydrogels, ultra-high molecular weight polyethylene, polyurethanes, polyureas, polyesters, degradable and resorbable polymeric biomaterial designs used in surgery and drug delivery, polymers for ophthalmologic and orthopedic applications, and biopolymers such as silks and collagen. Finally, the design of major industrial polymer processing equipment will be covered, and the fundamentals of extrusion, calendering, coating, fiber spinning, film blowing, and injection molding processes will be presented.
Prerequisite: MATH246; and CHEM231; and (CHBE301, ENMA461, or BIOE232).
Recommended: Knowledge of basic fluid dynamics: CHBE422/BIOE331 or equivalent.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: BIOE453, CHBE457, or ENMA425.

CHBE468 Research (1-3 Credits)
Investigation of a research project under the direction of a faculty member. Comprehensive reports are required.
Restriction: Permission of Chemical and Biomolecular Engineering Department; and must be third or fourth year student; and must have minimum GPA of 3.0; and must have successfully completed all lower level engineering, science and mathematics courses for the major.
Repeatable to: 6 credits.
Formerly: ENCH468.

CHBE469 Special Projects (1-3 Credits)
Special project under the direction of a faculty member. Comprehensive reports are required.
Restriction: Permission of Chemical and Biomolecular Engineering Department; and must be third or fourth year student; and must have minimum GPA of 3.0; and must have successfully completed all lower level engineering, science and mathematics courses for the major.
Repeatable to: 6 credits if content differs.

CHBE470 Colloid and Interface Science (3 Credits)
Introduction to colloidal systems and interfacial science. Topics include preparation, stability and coagulation kinetics of colloidal suspensions. Introduction to DLVO theory, electrokinetic phenomena, colloidal aggregation, interfacial phenomena, double layer theory, surface chemistry. Discussion of interfacial thermodynamics and interfacial forces for solid-liquid interfaces. Applications to nanomaterial synthesis, nanomaterial and polymer self-assembly, protein-protein interactions, and protein aggregation will be discussed.
Prerequisite: CHBE424 and CHBE426.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.

CHBE471 Particle Science and Technology (3 Credits)
Particles are everywhere. We breathe them, eat them, and use them to make many non-particulate materials. Knowledge of particle science and technology is important for manufacturing, for occupational health and safety, as well as environmental considerations. In this multidisciplinary course, the focus will be on the study of science and technology relevant to multiphase systems consisting of solid and/or liquid particles surrounded by a gas. These topics fall loosely under the headings of powder and aerosol technology. Team design projects will be an integral component.
Prerequisite: Knowledge of undergraduate engineering thermodynamics, and transport phenomena; knowledge of numerical methods for solving systems of ordinary differential equations.
Restriction: Must be in a major within ENGR-Chemical & Biomolecular Engineering department; or permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE471 or ENCH471.
Formerly: ENCH471.

CHBE472 Control of Air Pollution Sources (3 Credits)
Sources and effects of air pollutants, regulatory trends, atmospheric dispersion models, fundamentals of two-phase flow as applied to air pollution and air pollution control systems, design of systems for control of gases and particulate matter.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.

CHBE473 Electrochemical Energy Engineering (3 Credits)
The lecture will start from the basic electrochemical thermodynamics and kinetics, with emphasis on electrochemical techniques, fundamental principle and performance of batteries, and supercapacitors.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH468K or CHBE473.
Formerly: ENCH468K.

CHBE474 Biopharmaceutical Process Development and Manufacturing (3 Credits)
Covers the fundamental steps involved in process development and manufacturing of biopharmaceuticals. An overview of different classes of biopharmaceuticals as well as manufacturing requirements for clinical development and regulatory approval will be provided. In depth coverage of manufacturing steps including cell culture, purification and formulation as well as drug product manufacturing, analysis and stability will be covered. Scientific literature will be used to highlight current challenges and novel solutions in each step of the manufacturing process. Scale up considerations, GMP requirements and process economics will also be introduced.
Prerequisite: BIOE120; and permission of instructor.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE474, BIOE489T, or ENCH648D.

CHBE475 Ethics in Science and Engineering (3 Credits)
Ethical issues in science and engineering and their resolutions are examined. The main topics will be ethics and scientific truth (including issues of proper data analysis, proper data presentation, and record-keeping), ethics and other scientists and engineers (including issues of attribution, confidentiality, conflicts of interest, mentoring, and inclusion of under-represented groups), ethics and the practice of engineering (including responsibilities of engineers to clients, ecological issues, and conflicts of interest), and ethics and society (including funding priorities, moral issues, and human and animal subjects). Class meetings will be organized around discussions, case studies, and student reports. The course is aimed at postdoctoral students, graduate students and advanced undergraduate students who wish to ponder the important contemporary questions about the ethics of how science and engineering get done.
Credit Only Granted for: CHBE475 or ENCH475.
Formerly: ENCH475.

CHBE476 Molecular Modeling Methods (3 Credits)
Statistical mechanics will be introduced to give the fundamental background for atomic to mesoscale molecular modeling. Classical atomic-level simulations methods (Monte Carlo and Molecular Dynamics) and the procedures to develop intra- and intermolecular potentials will be covered. This course will also discuss the theory and application of coarse-grained molecular simulations, mesoscale simulations and other modern simulation techniques. A broad range of applications will be included throughout the semester, e.g., phase behavior of small molecules, kinetics, and biophysics.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH468P or CHBE476.
Formerly: ENCH468P.

CHBE477 Mesoscopic and Nanoscale Thermodynamics (3 Credits)
Interdisciplinary course primarily for graduate and senior undergraduate students from engineering or science departments. New emerging technologies deal with bio-membrane and gene engineering, microreactor chemistry and microcapsule drug delivery, micro-fluids and porous media, nanoparticles and nanostructures, supercritical fluid extraction and artifical organs. Engineers often design processes where classical thermodynamics may be insufficient, e.g., strongly fluctuating and nanoscale systems, or dissipative systems under conditions far away from equilibrium.
Prerequisite: A prior course in classical thermodynamics.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE477 or ENCH468Q.
Formerly: ENCH468Q.

CHBE480 Bionanotechnology: Physical Principles (3 Credits)
Physics at nano/micro scales. Biomolecular building blocks. Simplest biomolecular assembly: protein folding. Nanoscale intermolecular interactions important for biology. Protein-ligand binding. Protein higher-order assembly: filaments, networks. Protein filaments and motility. DNA, RNA and their assembly assisted by proteins. Viral capsid assembly. Lipid assembly into micelles, bilayers. Lipid-protein co-assembly in membranes. Lipid and polymer structures useful in medicine. Targeted delivery of drugs, genes by nano/micro structures. Cellular assembly in the eye, in insect wings. Cellular assembly at surfaces: gecko feet, duck feathers. Cellular assembly in the presence of crystals: biomineralization.
Prerequisite: BIOE120; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.

CHBE481 Transport Phenomena in Small and Biological Systems (3 Credits)
Interdisciplinary course primarily for senior undergraduate and graduate students from engineering or science departments. The course's main goal is to make the students familiar with the fundamental physics and modeling of transport phenomena in small and biological systems, and their current scientific and engineering utilization in microfluidics, nanofluidics and biological systems.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH468W or CHBE481.
Formerly: ENCH468W.

CHBE482 Biochemical Engineering (3 Credits)
Introduction to biochemical and microbiological applications to commericail and engineering processes, including industrial fermentation, enzymology, ultrafiltration, food and pharmaceutical processing and resulting waste treatment. Enzyme kinetics, cell growth, energetics and mass transfer.
Prerequisite: CHBE440.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE482 or ENCH482.
Formerly: ENCH482.

CHBE483 Bioseparations (3 Credits)
Engineering fundamentals of separations and purification of biological molecules. Case studies and examples illustrate principles and practice of centrifugation, precipitation, crystallization, filtration, membrane separations, chromatography, and affinity separation of recombinant proteins and other biomolecules. Process scale-up and economics of biotechnology products and processes.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH483 or CHBE483.
Formerly: ENCH483.

CHBE484 Metabolic Pathway Engineering (3 Credits)
The state-of-the-art in metabolic engineering, with a focus on the analysis and engineering of metabolic pathways through (chemical) engineering principles, will be covered. Topics covered include: (1) overview of biochemistry and metabolism; (2) metabolic flux analysis and isotope labeling illustrated with examples from the recent scientific literature; (3) technologies for engineering metabolic pathways; (4) metabolic control analysis and pathway regulation; (5) applications of metabolic engineering to synthesis of biofuels and therapeutics; (6) specialized and related subjects such as protein engineering and synthetic biology.
Prerequisite: CHBE101 and CHBE440.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH468M or CHBE484.
Formerly: ENCH468M.

CHBE485 Biochemical Engineering Laboratory (3 Credits)
Techniques of measuring pertinent parameters in fermentation reactors, quantification of production variables for primary and secondary metabolites such as enzymes and antibiotics, the insolubilization of enzymes for reactors, and the demonstration of separation techniques such as ultrafiltration and affinity chromatography.
Credit Only Granted for: CHBE485 or ENCH485.
Formerly: ENCH485.

CHBE486 Heterogeneous Catalysis for Energy Applications (3 Credits)
Introduction to heterogeneous catalytic science and technology for energy conversion and hydocarbon processing. Preparation and mechanistic characterization of catalyst systems, kinetics of catalyzed reactions, adsorption and diffusion influences in heterogenious reactions. An overview of heterogeneous catalysis in various energy-related applications, including petroleum refining, chemicals from biomass, valorization of shale gas, and CO2 utilization will be introduced.
Prerequisite: Minimum grade of C- in CHBE302, CHBE424, and CHBE440; and permission of instructor.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: CHBE486 or ENCH686.

CHBE487 Tissue Engineering (3 Credits)
A review of the fundamental principles involved in the design of engineered tissues and organs. Both biological and engineering fundamentals will be considered.
Prerequisite: Must have completed at least one biology course; and MATH241.
Recommended: BSCI330 and BIOE340.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; or permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: BIOE411, CHBE487, or ENCH468T.
Formerly: ENCH468T.

CHBE490 Polymer Science (3 Credits)
The elements of the polymer chemistry and industrial polymerization, polymer structures and physics, thermodynamics of polymer solutions, polymer processing methods, and engineering applications of polymers.
Credit Only Granted for: CHBE490, ENCH490, or ENMA495.
Formerly: ENCH490.

CHBE495 Nanoparticle Aerosol Dynamics and Particle Technology (3 Credits)
NanoParticles (NA) (< 100 nm), and their science and technology play an important role in nature and industry. From air quality standards, nuclear reactor safety, inhalation therapy, workplace exposure, global climate change, to counterterrorism, aerosols play a central role in our environment. On the industrial side, NA plays an integral part of reinforcing fillers, pigments and catalysts, and the new emerging field of nanotechnology, they are the building blocks to new materials, which encompass, electronic, photonic and magnetic devices, and bio and chemical sensors.
Restriction: Must be in a major within the ENGR-Chemical & Biomolecular Engineering department; and permission of ENGR-Chemical & Biomolecular Engineering department.

CHBE496 Processing and Engineering of Polymers (3 Credits)
A comprehensive analysis of processing and engineering techniques for the conversion of polymeric materials into useful products. Evaluation of the performance of polymer processes, design of polymer processing equipment.
Credit Only Granted for: CHBE496 or ENCH496.
Formerly: ENCH496.

CHBE497 Protein Engineering (3 Credits)
This course will cover the fundamentals of protein engineering and its applications in medicine, chemical processes, and energy. Topics will include the structure and function of biological molecules, rational design and directed evolution, construction of protein and peptide libraries, protein screening platforms, methods for characterizing structure and function of biological molecules. Scientific literature will be used to highlight key discoveries and current work in protein engineering.
Prerequisite: BIOE120, CHBE302, and CHBE440; and permission of instructor.
Credit Only Granted for: CHBE497, BIOE489R, or ENCH 648P.

CHBE608 Research in Chemical Engineering (1 Credit)
Students gain experience in research through lab rotations and experience presenting their findings.
Restriction: Must be in the Chemical Engineering Doctoral or Master of Science program.
Repeatable to: 8 credits.

CHBE609 Graduate Seminar (1 Credit)
Seminar in Chemical and Biomolecular Engineering
Repeatable to: 4 credits.

CHBE610 Chemical Engineering Thermodynamics (3 Credits)
Advanced application of the general thermodynamic methods to chemical engineering problems. First and second law consequences; estimation and correlation of thermodynamic properties; phase and chemical reaction equilibria.
Prerequisite: CHBE301; and CHBE302. Or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH610 or CHBE610.
Formerly: ENCH610.

CHBE620 Methods of Engineering Analysis (3 Credits)
Application of selected mathematical techniques to the analysis and solution of engineering problems; included are the applications of matrices, vectors, tensors, differential equations, integral transforms, and probability methods to such problems as unsteady heat transfer, transient phenomena in mass transfer operations, stagewise processes, chemical reactors, process control, and nuclear reactor physics.
Prerequisite: MATH246 and CHBE250; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ENCH620 or CHBE620.
Formerly: ENCH620.

CHBE630 Transport Phenomena (3 Credits)
Heat, mass and momentum transfer theory from the viewpoint of the basic transport equations. Steady and unsteady state; laminar and turbulent flow; boundary layer theory, mechanics of turbulent transport; with specific application to complex chemical engineering situations.
Prerequisite: CHBE422; and ENCH424. Or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH630 or CHBE630.
Formerly: ENCH630.

CHBE640 Advanced Chemical Reaction Kinetics (3 Credits)
The theory and application of chemical reaction kinetics to reactor design. Reaction rate theory; homogeneous batch and flow reactors; fundamentals of catalysis; design of heterogeneous flow reactors.
Prerequisite: CHBE440; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH640 or CHBE640.
Formerly: ENCH640.

CHBE672 Control of Air Pollution Sources (3 Credits)
Sources and effects of air pollutants, regulatory trends, atmospheric dispersion models, fundamentals of two-phase flow as applied to air pollution and air pollution control systems, design of systems for control of gases and particulate matter.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department. Jointly offered with: CHBE472.
Credit Only Granted for: CHBE472 or CHBE672.

CHBE686 Advanced Heterogeneous Catalysis for Energy Applications (3 Credits)
Introduction to heterogeneous catalytic science and technology for energy conversion and hydocarbon processing. Preparation and mechanistic characterization of catalyst systems, kinetics of catalyzed reactions, adsorption and diffusion influences in heterogenious reactions. An overview of heterogeneous catalysis in various energy-related applications, including petroleum refining, chemicals from biomass, valorization of shale gas, and CO2 utilization will be introduced.
Prerequisite: Minimum grade of C- in CHBE302, CHBE424, and CHBE440; and permission of instructor.
Restriction: Permission of instructor. Jointly offered with: CHBE486.
Credit Only Granted for: CHBE486, ENCH686 or CHBE686.
Formerly: ENCH686.

CHBE690 Polymer Reaction Engineering (3 Credits)
Advanced topics in polymerization kinetics, reactor design and analysis; addition and step-growth polymerization; homogeneous and heterogeneous polymerization; photopolymerization; reactor dynamics; optimal operation and control of industrial polymerization reactors.
Prerequisite: ENCH640; or permission of instructor.
Credit Only Granted for: ENCH781 or CHBE690.
Formerly: ENCH781.

CHEM - Chemistry

CHEM401 Inorganic Chemistry (3 Credits)
An overview of basic concepts of the electronic structure of the elements, chemical bonding and reactivity, from simple diatomic molecules to coordination compounds. These are viewed from simple (Lewis) to the most comprehensive molecular orbital theory. Symmetry and group theory are used throughout the course.
Prerequisite: CHEM276 or CHEM271; and (CHEM247 or CHEM241).

CHEM403 Radiochemistry (3 Credits)
Radioactive decay; introduction to properties of atomic nuclei; nuclear processes in cosmology; chemical, biomedical and environmental applications of radioactivity; nuclear processes as chemical tools; interaction of radiation with matter.
Prerequisite: Must have completed one year of college chemistry and one year of college physics.

CHEM425 Instrumental Methods of Analysis (4 Credits)
Modern instrumentation in analytical chemistry. Electronics, spectroscopy, chromatography and electrochemistry.
Prerequisite: CHEM272 and CHEM271; or (CHEM276 and CHEM277).

CHEM441 Advanced Organic Chemistry (3 Credits)
An advanced study of the compounds of carbon, with special emphasis on molecular orbital theory and organic reaction mechanisms.
Prerequisite: Must have completed or be concurrently enrolled in CHEM481; and 1 course with a minimum grade of C- from (CHEM241, CHEM247). Jointly offered with CHEM641.

CHEM460 Structure Determination Using Spectroscopic Methods (3 Credits)
The use of infrared, ultraviolet-visible, proton and carbon-13 nuclear magnetic resonance and mass spectroscopy for structure determination in organic chemistry.
Prerequisite: Must have completed CHEM243; or CHEM247; or (CHEM241 and CHEM242).
Formerly: CHEM660.

CHEM471 Techniques in Pulse NMR (1 Credit)
NMR techniques to operate, adjust, and calibrate the spectrometers and acquire and process NMR data in one and two dimensional NMR applications.
Prerequisite: CHEM241 and CHEM242; or CHEM247.
Recommended: CHEM460.
Restriction: Senior standing or higher.
Additional Information: Persons with heart pacemakers and/or metal implants cannot take the course due to potential health hazards.

CHEM474 Environmental Chemistry (3 Credits)
The sources of various elements and chemical reactions between them in the atmosphere and hydrosphere are treated. Causes and biological effects of air and water pollution by certain elements are discussed.
Prerequisite: CHEM481.

CHEM481 Physical Chemistry I (3 Credits)
Thermodynamics and kinetics of chemical and molecular systems. Topics may include internal energy, heat, work, enthalpy, entropy, free energy, and spontaneity as well as reaction order, differential rate laws, integrated rate laws, and rate laws for multi-step processes.
Prerequisite: Minimum grade of C- in CHEM135; or minimum grade of C- in CHEM271 and CHEM272; or minimum grade of C- in CHEM276 and CHEM277. And minimum grade of C- in MATH141. And minimum grade of C- in PHYS260 and PHYS261; or minimum grade of C- in PHYS141.

CHEM482 Physical Chemistry II (3 Credits)
Quantum mechanical nature of atoms and molecules. Topics may include model systems for electronic, vibrational, rotational and translational energies as well as connections to molecular spectroscopy and thermal distributions.
Prerequisite: Minimum grade of C- in CHEM481.

CHEM483 Physical Chemistry Laboratory I (2 Credits)
An introduction to the principles and application of quantitative techniques in physical chemical measurements. Experiments will be coordinated with topics in CHEM481.
Prerequisite: Must have completed or be concurrently enrolled in CHEM481.

CHEM484 Physical Chemistry Laboratory II (2 Credits)
A continuation of CHEM 483. Advanced quantitative techniques necessary in physical chemical measurements. Experiments will be coordinated with topics in CHEM 482.
Prerequisite: CHEM481 and CHEM483; and must have completed or be concurrently enrolled in CHEM482.

CHEM498 Special Topics in Chemistry (3 Credits)
Prerequisite: Prerequisite varies with the nature of the topic being considered.

CHEM601 Structure and Bonding of Molecules and Materials (3 Credits)
Development of the tools necessary to use the knowledge of structure and bonding of molecules and solids in the practice of synthetic inorganic and materials chemistry. Several bonding models are covered, from the simple valence bond and ligand field models to a quantitative group theoretical treatment of molecular orbital theory and band structure descriptions of solids. Concepts of electron counting and oxidation state and ligand characteristics are revisited in terms of the more sophisticated bonding models. Finally, these models are used to analyze the reactivity, magnetic and spectroscopic properties of inorganic coordination compounds. Prior advanced inorganic and/or advanced quantum chemistry courses are not prerequisites.

CHEM602 Advanced Inorganic Chemistry II (3 Credits)
A continuation of CHEM 601 with emphasis on the application of contemporary spectroscopic techniques to inorganic problems.
Prerequisite: CHEM601; or permission of instructor.

CHEM608 Selected Topics in Inorganic Chemistry (1-3 Credits)
Topics of special interest and current importance.
Prerequisite: CHEM602 and CHEM601; or students who have taken courses with comparable content may contact the department.
Repeatable to: 6 credits if content differs.

CHEM611 Professional Skills for New Graduate Students (1 Credit)
Covers a wide range of topics in professional development for new graduate students.
Restriction: Must be in one of the following programs (Chemistry (Master's); Biochemistry (Master's); Biochemistry (Doctoral); Chemistry (Doctoral)) ; and must be a new graduate student.

CHEM612 Scientific Presentations (1 Credit)
Workshops will cover all aspects of giving scientific presentations. Each student will give a presentation based oon the topic of his/her final paper in CHEM611. Presentations will be critiqued by peers and faculty members.
Prerequisite: CHEM611.

CHEM623 Optical Methods of Quantitative Analysis (3 Credits)
The quantitative applications of various methods of optical spectroscopy.
Prerequisite: CHEM482; or students who have taken courses with comparable content may contact the department.

CHEM624 Electrical Methods of Quantitative Analysis (3 Credits)
The use of conductivity, potentiometry, polarography, voltammetry, amperometry, coulometry, and chronopotentiometry in quantitative analysis.
Prerequisite: CHEM482; or students who have taken courses with comparable content may contact the department.

CHEM625 Separation Methods in Quantitative Analysis (3 Credits)
The theory and application for quantitative analysis of various forms of chromatography, ion exchange, solvent extraction, distillation, and mass spectroscopy.
Prerequisite: CHEM482; or students who have taken courses with comparable content may contact the department.

CHEM640 Problems in Organic Reaction Mechanisms (1 Credit)
A tutorial type course dealing with the basic description of the fundamentals of writing organic reaction mechanisms.

CHEM641 Organic Reaction Mechanisms (3 Credits)
Jointly offered with CHEM441.

CHEM647 Organic Synthesis (3 Credits)
The use of new reagents in organic reactions; multistep syntheses leading to natural products of biological interest; stereospecific and regiospecific reactions and their use in total synthesis.

CHEM648 Special Topics in Organic Chemistry (1-3 Credits)
Topics of special interest and current importance.
Repeatable to: 9 credits if content differs.

CHEM650 Problems in Organic Synthesis (1 Credit)
A tutorial type course dealing with mechanistic problems from the current literature of organic sysnthesis.

CHEM678 Special Topics in Environmental Chemistry (3 Credits)
In-depth treatment of environmental chemistry problem areas of current research interest. The topics will vary somewhat from year to year.
Prerequisite: CHEM474.
Repeatable to: 6 credits if content differs.

CHEM682 Chemical Kinetics and Dynamics (3 Credits)
The dynamics of atoms and molecules as they undergo chemical and physical change. Topics will be developed from a fundamental perspective and modern applications will be discussed. Topics include: chemical kinetics rate equations, atomic and molecular collisions; rate theories; atomic, molecular and chemical lasers; control of matter with light.
Prerequisite: CHEM482; or permission of instructor.
Restriction: Restricted to graduate students or advanced undergraduates with prerequisites.

CHEM684 Chemical Thermodynamics (3 Credits)
Prerequisite: CHEM482; or students who have taken courses with comparable content may contact the department.

CHEM687 Statistical Mechanics and Chemistry (3 Credits)
Prerequisite: CHEM684; or students who have taken courses with comparable content may contact the department.

CHEM688 Selected Topics in Physical Chemistry (2 Credits)
Repeatable to: 6 credits if content differs.

CHEM689 Special Topics in Physical Chemistry (3 Credits)
Repeatable to: 9 credits if content differs.

CHEM690 Quantum Chemistry I (3 Credits)

CHEM691 Quantum Chemistry II (3 Credits)
Prerequisite: CHEM690 or PHYS622.

CHEM698 Literature Seminar in Chemistry (1 Credit)
Students will prepare and present a departmental seminar baseed on a topic in the current research literature.
Restriction: Must be in a major within CMNS-Chemistry & Biochemistry department.

CHEM699 Special Problems in Chemistry (1-6 Credits)
Laboratory experience in a research environment.
Prerequisite: One semester of graduate study in chemistry.
Restriction: Restricted to students in the non-thesis M.S. option.
Repeatable to: 6 credits.

CHEM703 Introduction to Nonequilibrium Statistical Physics (3 Credits)
Analysis and microscopic modeling of systems away from thermal equilibrium. Linear response theory, ergodicity, Brownian motion, Monte Carlo modeling, thermal ratchets, far-from-equilibrium fluctuation relations. Introduction to the theoretical tools of nonequilibrium phenomena and their application to problems in physics, chemistry and biology.
Prerequisite: PHYS603 or CHEM687; or permission of instructor.
Credit Only Granted for: CHPH703, CHPH718B, CHEM703, CHEM718B, PHYS703, OR PHYS798Z.
Formerly: CHEM718B.

CHEM705 Nuclear Chemistry (3 Credits)
Nuclear structure models, radioactive decay processes, nuclear reactions in complex nuclei, fission, nucleosynthesis and nuclear particle accelerators.

CHEM729 Special Topics in Geochemistry (1-3 Credits)
A discussion of current research problems.
Repeatable to: 6 credits if content differs.

CHEM799 Master's Thesis Research (1-6 Credits)

CHEM889 Seminar (1 Credit)

CHEM898 Pre-Candidacy Research (1-8 Credits)

CHEM899 Doctoral Dissertation Research (1-8 Credits)

CHIN - Chinese

CHIN401 Readings in Modern Chinese I (3 Credits)
Readings in history, politics, economics, sociology, and literature. Emphasis on wide-ranging, rapid reading, reinforced by conversations and compositions.
Prerequisite: CHIN302; or students who have taken courses with comparable content may contact the department. And must have taken a placement interview offered by the department for Non-majors.

CHIN402 Readings in Modern Chinese II (3 Credits)
Continuation of CHIN401.
Prerequisite: CHIN401; or students who have taken courses with comparable content may contact the department. And must have taken a placement interview offered by the department for Non-majors.

CHIN403 Classical Chinese I (3 Credits)
Close readings and discussion of literary, philosophical and historical texts in the original language. The course situates texts in their historical context and also discusses differences between classical and modern Chinese.
Prerequisite: CHIN302 or CHIN306; or permission of instructor.
Additional Information: Texts in Chinese. Class discussion and course work mainly in English.

CHIN408 Selected Readings in Classical Chinese (3 Credits)
Selected readings in Classical Chinese, including important representative works of history, poetry, and parallel prose. Close attention is paid to matters of grammar and phonology in the readings. Content will differ each time this course is offered.
Prerequisite: CHIN321; and must have knowledge of Pinyin.
Repeatable to: 9 credits if content differs.

CHIN411 Business Chinese I (3 Credits)
Conversation, reading, and writing applicable to Chinese business transactions, social meetings, and meetings with government organizations, plus background material in English on professional business practices and social customs associated with business.
Prerequisite: CHIN402; or permission of ARHU-School of Languages, Literatures, and Cultures department. And must have taken a placement interview offered by the department for Non-majors.

CHIN412 Business Chinese II (3 Credits)
Continuation of CHIN411.
Prerequisite: CHIN402; or permission of ARHU-School of Languages, Literatures, and Cultures department. And must have taken a placement interview offered by the department for Non-majors.

CHIN415 Readings in Current Newspapers and Periodicals (3 Credits)
Reading of periodical literature on selected topics with discussions and essays in Chinese.
Prerequisite: CHIN402; or students who have taken courses with comparable content may contact the department. And must have taken a placement interview offered by the department for Non-majors.

CHIN418 Special Topics in Contemporary Chinese Fiction and Film (3 Credits)
Various approaches to the most recent textual productions of China and Taiwan. Taught in Chinese.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 12 credits if content differs.

CHIN422 Advanced Chinese Grammar (3 Credits)
Chinese sentence patterns studied and contrasted with English and in terms of current pedagogical as well as linguistic theories. Taught in English and Chinese.
Prerequisite: CHIN302; or permission of ARHU-School of Languages, Literatures, and Cultures department.

CHIN425 Ethnic and Cultural Diversity in China (3 Credits)
This course looks into ethnic and cultural diversity in China. It examines the evolution of the People's Republic of China's (PRC) ethnic policies in relation to nation-state building over the last six decades. Specifically, it studies how the PRC has categorized the Chinese people into 56 ethnic groups, how it has made affirmative action policies to accommodate ethnic diversity, and what problems its approaches have experienced and what solutions it has proposed in its accommodation of ethnicity and diversity in the 21st century. To examine the above issues, the course introduces and applies the concepts of ethnicity, nationality, ethnic nationalism, civic nationalism, identity, social Darwinism, the Soviet model of multinational state building, the Chinese model of inclusive Chinese nation state building, citizenship, individual rights, group rights, equality, and diversity.
Recommended: Any CHIN course or course on China.
Credit Only Granted for: CHIN425 or CHIN429G.
Formerly: CHIN429G.

CHIN428 Selected Topics in Chinese Linguistics (3 Credits)
Undergraduate seminar in Chinese linguistics. Topics may include the ancient writing system, historical phonology, dialectology, prosody and rhyming, grammar and the history of the language as a whole. This course may be repeated with different content, and satisfies the linguistics requirement for the Chinese major. Students are expected to be in at least Third Year Chinese. Taught in English.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Restriction: Sophomore standing or higher.
Repeatable to: 12 credits if content differs.

CHIN429 Selected Topics in Chinese Studies (3 Credits)
In-depth study of a particular aspect of Chinese cultural, linguistic, literary studies. Specific topic to be announced when course is offered. Taught in English.
Prerequisite: CHIN315.
Repeatable to: 6 credits if content differs.

CHIN441 Traditional Chinese Fiction (3 Credits)
Major works of fiction from the 4th century tales of the marvelous through the 19th century Qing novel. Readings are in classical Chinese and English. Designed for students with advanced language skills. Taught in English.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.

CHIN443 Cultural Histories of Medicine in China (3 Credits)
Investigates medical knowledge through traditional Chinese approaches to the body and beliefs about healing, including acupuncture, herbal medicine, prayer, ritual and folk medicine. Taught in English.
Restriction: Permission of department, School of Languages, Literatures and Cultures.

CHIN499 Directed Study in Chinese (1-3 Credits)
Readings in Chinese under faculty supervision.
Prerequisite: Permission of instructor.
Repeatable to: 6 credits if content differs.

CHIN602 The Language of Contemporary Chinese Audio Media (3 Credits)
Oral Chinese non-fiction in the high diglossic register, with emphasis on contextually and culturally appropriate interpretation of lexicon, style, and idiom. Conducted entirely in Chinese, intended for non-native speakers of the language pursuing professional levels of competence.
Prerequisite: Must have taken a placement test offered by the department.

CHIN603 The Language of Contemporary Chinese Written Fiction (3 Credits)
Chinese fiction writing, with emphasis on contextually and culturally appropriate interpretation of lexicon, style, and idiom in various genres. Conducted entirely in Chinese; intended for non-native speakers of the language pursuing professional levels of competence.
Prerequisite: Must have taken a placement test offered by the department.

CHIN611 Structure of the Chinese Language (3 Credits)
An overview of the basic linguistic characteristics of modern standard (Mandarin) Chinese, including phonology, morphology and syntax. Emphasis on the analysis of functional linguistic models and the development of student skills in critically appraising existing interpretations of Chinese language structure.

CHIN621 Chinese Historical Linguistics (3 Credits)
An introduction to the origin and development of the Chinese language, and its relationship to other languages.

CHPH - Chemical Physics

CHPH618 Special Projects in Chemical Physics (1-3 Credits)
Independent reading and study covering chemical physics subject areas not available in other courses.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

CHPH707 Advanced Laboratory - Photon Correlation Spectroscopy of Soft Matter (3-4 Credits)
The course is based at the Photon Correlation Spectroscopy facility, also known as Dynamic Light Scattering (DLS). The DLS has three state-of-the-art instruments for the characterization of nano-and meso-scale heterogeneities in soft-matter materials, such as nanoparticles, polymers, protein molecules in solution, gels, and microemulsions.

CHPH709 Seminar in Chemical Physics (1 Credit)
Current research and developments in chemical physics.

CHPH718 Special Topics in Chemical Physics (1-3 Credits)
A discussion of current research problems in chemical physics.
Repeatable to: 99 credits if content differs.

CHPH799 Master's Thesis Research (1-6 Credits)

CHPH898 Pre-Candidacy Research (1-8 Credits)

CHPH899 Doctoral Dissertation Research (1-8 Credits)

CLAS - Classics

CLAS409 Classics Capstone Seminar (3 Credits)
Comparative study of selected central aspects of both ancient Greek and Roman cultures as viewed from the standpoints of literary study, history, art history, and other fields as appropriate. Seminar format involving intensive student research.
Restriction: Permission of ARHU-Classics department.
Repeatable to: 6 credits if content differs.

CLAS419 The Classical Tradition (3 Credits)
Examination of the role of Greek and Roman civilization in shaping the arts and ideas of western culture.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: CLAS419 or CLAS420.
Formerly: CLAS420.

CLAS470 Approaches to Greek Mythology (3 Credits)
Ancient and modern approaches to understanding Greek myth as expression of human experience, including interpretations drawn from psychology, anthropology, and comparative mythology.
Prerequisite: CLAS170; or permission of ARHU-Classics department.

CLAS488 Independent Study in Classical Civilization (3 Credits)
Prerequisite: Permission of ARHU-Classics department.
Repeatable to: 6 credits if content differs.

CLAS499 Independent Study in Classical Languages and Literatures (1-3 Credits)
Prerequisite: Permission of ARHU-Classics department.

CLAS621 The Classical Tradition (3 Credits)
The role the classics have played in western thought, with particular attention to literature.

CLAS688 Special Topics in Classical Civilization (3 Credits)
Repeatable to: 9 credits if content differs.

CLAS699 Independent Study in Classical Civilization (1-3 Credits)
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

CLAS799 Master's Thesis Research (1-6 Credits)

CLFS - Chemical and Life Sciences

CLFS608 Seminar in Current Topics in Chemical and Life Science (1-3 Credits)
Seminar in current topics in the Life Sciences. Contact Program Director or instructor before registering.
Prerequisite: Two years of teaching experience; and CLFS510.
Restriction: Must be in Master of Chemical & Life Sciences (Master's) program; and permission of CMNS-Chemical & Life Sciences department.
Repeatable to: 6 credits if content differs.
Formerly: LFSC608.

CLFS609 Special Topics (1-3 Credits)
Individual instruction course. Contact Program Director or instructor before registering.
Prerequisite: Two years of teaching experience; and CLFS510.
Restriction: Must be in Master of Chemical & Life Sciences (Master's) program; and permission of CMNS-Chemical & Life Sciences department.
Repeatable to: 6 credits if content differs.
Formerly: LFSC609.

CLFS610 Natural Products Chemistry (3 Credits)
Foundations of natural products chemistry; how nature goes about making (biosynthesizing) these compounds and elements of enzymology and genomics relevant to production of these compounds; relevance of natural products chemistry as a driving force for drug discovery and innovation in biotechnology.
Restriction: Permission of CMNS-Chemical & Life Sciences department.
Credit Only Granted for: LFSC609D or LFSC610.
Formerly: LFSC609D.

CLFS619 Special Topics in Chemistry (1-3 Credits)
Topics of current interest and special importance.
Repeatable to: 9 credits if content differs.
Formerly: LFSC619.

CLFS620 Modern Molecular Genetics (3 Credits)
An overview of genetics including the genetic basis/components in prevalent diseases, genetically engineered organisms and foods, the importance of knowing the complete DNA sequence of organisms.

CLFS630 Principles of Transmission Genetics: A Historical and Modern Perspective (3 Credits)
Examines the origins of modern genetics, model genetic systems, and the role of chromosomes in vertical transmission of genetic information from parent to offspring. Classical gene mapping, population genetics and the various applications of modern genetics will also be studied.

CLFS640 Human Physiology (3 Credits)
Examination of the major organ system of the human body and of the neural and hormonal mechanisms responsible for their regulation and control.
Prerequisite: Two years of teaching experience; and CLFS510.
Restriction: Must be in Master of Chemical & Life Sciences (Master's) program; and permission of CMNS-Chemical & Life Sciences department.

CLFS655 The Chemistry and Applications of Electrochemical Cells (3 Credits)
Chemistry of electrochemical cells including the thermodynamic basis for the production of electrical energy by cells, the chemical reactions utilized by the most common cells, the manufacture of cells, and the application of cells in energy production.

CLFS660 Biodiversity and Conservation Biology (3 Credits)
Application of ecological and evolutionary principles to assess the impact of the human species on the environment and its inhabitants. Specific case studies are included to illustrate problems of bidiversityloss and actions required to reverse the trends.

CLFS665 Ecology and Global Change (3 Credits)
Ecological concepts across scales ranging from the individual, to populations, communities, ecosystems, and landscapes will be presented. Global change issues will encompass alteration of atmospheric trace gases, biogeochemistry cycles, land use changes, and introduction of non-native species to new habitats.
Credit Only Granted for: LFSC609C or LFSC665.
Formerly: LFSC609C.

CLFS680 Chemical Ecology (3 Credits)
An examination of the utilization of organic natural products by plants and animals for various life processes. Examples will include how materials are utilized for sexual selection, defense against predators, sexual attractants, and as natural herbicides and repellants.

CLFS690 Biochemistry (3 Credits)
An advanced overview of general biochemistry including a study of protein structure and their physical properties; how these properties relate to catalysis, regulation of catalysis and metabolic chemistry with respect to their relationship to physiological conditions.

CLFS710 Experimental Biology (6 Credits)
Participants develop skills in four areas of biological research while investigating a variety of biological systems. Those areas include: (1) iterative scientific methods, (2) basic laboratory techniques, (3) experimental design and analysis, and (4) critical evaluation of published research.
Formerly: LFSC710.

CLFS725 Experimental Design (2 Credits)
Experimental design and statistics for science teachers that emphasizes the underlying structure of data and how this affects the quality and reliability of experiments. Examines the nature of data, the methods for designing rigorous experiments, important experimental design formats, and the relationships between data structure and analysis. Course work focuses on the design and analysis of orginal experiments for a series of research problems.
Credit Only Granted for: LFSC710, LFSC719, or LFSC725.
Formerly: LFSC719.

500-level courses

you can't use these courses towards degree, blah blah blah or whatever you want to say, if anything....

CLFS510 Concepts of Modern Biology (3 Credits)
Discussion of recent advancements in the biological sciences. Includes in depth treatment of the background information responsible for the advancements. Not acceptable for credit towards a degree.
Prerequisite: Permission of CMNS-Chemical & Life Sciences department.

CLFS520 Concepts of Modern Chemistry (3 Credits)
Basic concepts and recent advances in the chemical sciences. It is designed to be a review of the first two years of college chemistry for the student persuing the Master of Life Science degree with a concentration in chemistry. Also includes material preparatory for LFSC courses such as LFSC 690 and LFSC 655. A basic text supplemented by on line text, problems and links. (Not acceptable for credit towards a degree).

CMLT - Comparative Literature

CMLT469 The Continental Novel (3 Credits)
The novel in translation from Stendhal through the existentialists, selected from literatures of France, Germany, Italy, Russia, and Spain.

CMLT479 Major Contemporary Authors (3 Credits)

CMLT488 Genres (3 Credits)
A study of a recognized literary form, such as tragedy, film, satire, literary criticism, comedy, tragicomedy, etc.
Repeatable to: 6 credits if content differs.

CMLT489 Major Writers (3 Credits)
Each semester two major writers from different cultures and languages will be studied. Authors will be chosen on the basis of significant relationships of cultural and aesthetic contexts, analogies between their respective works, and the importance of each writer to his literary tradition.

CMLT498 Selected Topics in Comparative Studies (3 Credits)

CMLT639 Studies in the Renaissance (3 Credits)
Repeatable to: 9 credits.

CMLT649 Studies in Eighteenth Century Literature (3 Credits)
Studies in eighteenth century literature: as announced.
Repeatable to: 9 credits.

CMLT658 Studies in Romanticism (3 Credits)
Studies in romanticism: as announced.
Repeatable to: 9 credits.

CMLT679 Topics in Comparative Studies (3 Credits)
Seminar in modern and contemporary literature: as announced.
Repeatable to: 9 credits.

CMLT699 Independent Study (1-6 Credits)
Research and writing on specific readings on a topic selected by the student which is approved and supervised by a faculty member.
Restriction: Permission of instructor.
Repeatable to: 9 credits if content differs.

CMLT702 Cultures of Theory (3 Credits)
An exploration of the socio-historic, material, and cultural contexts of various theoretical practices and traditions.
Prerequisite: Must have completed an introductory course in critical theory. Cross-listed with ENGL702.
Credit Only Granted for: CMLT702 or ENGL702.

CMLT788 Practicum in Comparative Studies (1-6 Credits)
Practical professional training for individuals and groups of students in supervised settings.
Prerequisite: Permission of ARHU-English department.
Repeatable to: 20 credits if content differs.

CMLT799 Master's Thesis Research (1-6 Credits)

CMLT898 Pre-Candidacy Research (1-8 Credits)

CMLT899 Doctoral Dissertation Research (1-8 Credits)

CMSC - Computer Science

CMSC402 Bioinformatic Algorithms and Methods for Functional Genomics and Proteomics (3 Credits)
An introduction to the fundamental concepts in the computational analysis of biological systems with applications to: functional genomics, population genetics, proteomics and epigenetics. Computational concepts covered: network and graph algorithms, combinatorial algorithms, machine learning, large data/network visualization, statistical modeling and inference, probabilistic graphical models, sparse methods in data analysis, numerical optimization. No prior knowledge of biology required.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; and permission of CMNS-Computer Science department.

CMSC411 Computer Systems Architecture (3 Credits)
Input/output processors and techniques. Intra-system communication, buses, caches. Addressing and memory hierarchies. Microprogramming, parallelism, and pipelining.
Prerequisite: Minimum grade of C- in CMSC330; or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Restriction: Permission of CMNS-Computer Science department.
Credit Only Granted for: ENEE446 or CMSC411.

CMSC412 Operating Systems (4 Credits)
A hands-on introduction to operating systems, including topics in: multiprogramming, communication and synchronization, memory management, IO subsystems, and resource scheduling polices. The laboratory component consists of constructing a small kernel, including functions for device IO, multi-tasking, and memory management.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; and 1 course with a minimum grade of C- from (CMSC414, CMSC417, CMSC420, CMSC430, CMSC433, CMSC435, ENEE440, ENEE457).
Restriction: Permission of CMNS-Computer Science department; or must be in one of the following programs (Computer Science (Master's); Computer Science (Doctoral)).
Credit Only Granted for: CMSC412 or ENEE447.

CMSC414 Computer and Network Security (3 Credits)
An introduction to the topic of security in the context of computer systems and networks. Identify, analyze, and solve network-related security problems in computer systems. Fundamentals of number theory, authentication, and encryption technologies, as well as the practical problems that have to be solved in order to make those technologies workable in a networked environment, particularly in the wide-area Internet environment.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Restriction: Permission of CMNS-Computer Science department.
Credit Only Granted for: CMSC414, ENEE459C, or ENEE457.

CMSC416 Introduction to Parallel Computing (3 Credits)
Introduction to parallel computing. Topics include programming for shared memory and distributed memory parallel architectures, and fundamental issues in design, development, and performance analysis of parallel programs.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; or permission of instructor.
Restriction: Permission of CMNS-Computer Science department.
Credit Only Granted for: CMSC416 or CMSC498X.
Formerly: CMSC498X.

CMSC417 Computer Networks (3 Credits)
Computer networks and architectures. The OSI model including discussion and examples of various network layers. A general introduction to existing network protocols. Communication protocol specification, analysis, and testing.
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC420 Advanced Data Structures (3 Credits)
Description, properties, and storage allocation functions of data structures including balanced binary trees, B-Trees, hash tables, skiplists, tries, KD-Trees and Quadtrees. Algorithms for manipulating structures. Applications from areas such as String Processing, Computer Graphics, Information Retrieval, Computer Networks, Computer Vision, and Operating Systems.
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC421 Introduction to Artificial Intelligence (3 Credits)
Introduces a range of ideas and methods in AI, varying semester to semester but chosen largely from: automated heuristic search, planning, games, knowledge representation, logical and statistical inference, learning, natural language processing, vision, robotics, cognitive modeling, and intelligent agents. Programming projects will help students obtain a hands-on feel for various topics.
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC422 Introduction to Machine Learning (3 Credits)
Machine Learning studies representations and algorithms that allow machines to improve their performance on a task from experience. This is a broad overview of existing methods for machine learning and an introduction to adaptive systems in general. Emphasis is given to practical aspects of machine learning and data mining.
Prerequisite: Minimum grade of C- in CMSC320, CMSC330, and CMSC351; and 1 course with a minimum grade of C- from (MATH240, MATH461); and permission of CMNS-Computer Science department.

CMSC423 Bioinformatic Algorithms, Databases, and Tools (3 Credits)
An introduction to the main algorithms, databases, and tools used in bioinformatics. Topics may include assembly and analysis of genome sequences, reconstructing evolutionary histories, predicting protein structure, and clustering of biological data. Use of scripting languages to perform analysis tasks on biological data. No prior knowledge of biology is assumed.
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC424 Database Design (3 Credits)
Students are introduced to database systems and motivates the database approach as a mechanism for modeling the real world. An in-depth coverage of the relational model, logical database design, query languages, and other database concepts including query optimization, concurrency control; transaction management, and log based crash recovery. Distributed and Web database architectures are also discussed.
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC425 Game Programming (3 Credits)
An introduction to the principles and practice of computer game programming and design. This includes an introduction to game hardware and systems, the principles of game design, object and terrain modeling, game physics, artificial intelligence for games, networking for games, rendering and animation, and aural rendering. Course topics are reinforced through the design and implementation of a working computer game.
Prerequisite: Minimum grade of C- in CMSC420.

CMSC426 Computer Vision (3 Credits)
An introduction to basic concepts and techniques in computervision. This includes low-level operations such as image filtering and edge detection, 3D reconstruction of scenes using stereo and structure from motion, and object detection, recognition and classification.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Restriction: Permission of CMNS-Computer Science department.

CMSC427 Computer Graphics (3 Credits)
An introduction to 3D computer graphics, focusing on the underlying building blocks and algorithms for applications such as 3D computer games, and augmented and virtual reality (AR/VR). Covers the basics of 3D image generation and 3D modeling, with an emphasis on interactive applications. Discusses the representation of 3D geometry, 3D transformations, projections, rasterization, basics of color spaces, texturing and lighting models, as well as programming of modern Graphics Processing Units (GPUs). Includes programming projects where students build their own 3D rendering engine step-by-step.
Prerequisite: MATH240; and minimum grade of C- in CMSC420; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC430 Introduction to Compilers (3 Credits)
Topics include lexical analysis, parsing, intermediate representations, program analysis, optimization, and code generation.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC433 Programming Language Technologies and Paradigms (3 Credits)
Programming language technologies (e.g., object-oriented programming), their implementations and use in software design and implementation.
Prerequisite: Minimum grade of C- in CMSC330; or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Restriction: Permission of CMNS-Computer Science department.

CMSC434 Introduction to Human-Computer Interaction (3 Credits)
Assess usability by quantitative and qualitative methods. Conduct task analyses, usability tests, expert reviews, and continuing assessments of working products by interviews, surveys, and logging. Apply design processes and guidelines to develop professional quality user interfaces. Build low-fidelity paper mockups, and a high-fidelity prototype using contemporary tools such as graphic editors and a graphical programming environment (eg: Visual Basic, Java).
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC435 Software Engineering (3 Credits)
State-of-the-art techniques in software design and development. Laboratory experience in applying the techniques covered. Structured design, structured programming, top-down design and development, segmentation and modularization techniques, iterative enhancement, design and code inspection techniques, correctness, and chief-programmer teams. The development of a large software project.
Prerequisite: 1 course with a minimum grade of C- from (CMSC412, CMSC417, CMSC420, CMSC430, CMSC433); and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC436 Programming Handheld Systems (3 Credits)
Fundamental principles and concepts that underlie the programming of handheld systems, such as mobile phones, personal digital assistants, and tablet computers. Particular emphasis will be placed on concepts such as limited display size, power, memory and CPU speed; and new input modalities, where handheld systems differ substantially from non-handheld systems, and thus require special programming tools and approaches. Students will apply these concepts and principles in the context of an existing handset programming platform.
Prerequisite: Minimum grade of C- in CMSC330 and CMSC351; or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Restriction: Permission of CMNS-Computer Science department.

CMSC451 Design and Analysis of Computer Algorithms (3 Credits)
Fundamental techniques for designing efficient computer algorithms, proving their correctness, and analyzing their complexity. General topics include graph algorithms, basic algorithm design paradigms (such as greedy algorithms, divide-and-conquer, and dynamic programming), network flows, NP-completeness, and other selected topics in algorithms.
Prerequisite: Minimum grade of C- in CMSC351; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC452 Elementary Theory of Computation (3 Credits)
Techniques are developed to determine the difficulty of a problem relative to a model of computation. Topics include Finite Automata, P, NP, decidability, undecidability, and communication complexity.
Prerequisite: Minimum grade of C- in CMSC351; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.

CMSC454 Algorithms for Data Science (3 Credits)
Fundamental methods for processing a high volume of data. Methods include stream processing, locally sensitive hashing, web search methods, page rank computation, network and link analysis, dynamic graph algorithms as well as methods to handle high dimensional data/ dimensionality reduction.
Prerequisite: Minimum grade of C- in CMSC320, CMSC330, and CMSC351.
Restriction: Permission of CMSC-Computer Science department.
Credit Only Granted for: CMSC454 or CMSC498U.
Formerly: CMSC498U.

CMSC456 Cryptography (3 Credits)
The theory, application, and implementation of mathematical techniques used to secure modern communications. Topics include symmetric and public-key encryption, message integrity, hash functions, block-cipher design and analysis, number theory, and digital signatures.
Prerequisite: (CMSC106, CMSC131, or ENEE150; or equivalent programming experience); and (2 courses from (CMSC330, CMSC351, ENEE324, or ENEE380); or any one of these courses and a 400-level MATH course, or two 400-level MATH courses). Or permission of instructor. Also offered as: MATH456, ENEE456.
Credit Only Granted for: MATH456, CMSC456, or ENEE456.

CMSC457 Introduction to Quantum Computing (3 Credits)
An introduction to the concept of a quantum computer, including algorithms that outperform classical computation and methods for performing quantum computation reliably in the presence of noise. As this is a multidisciplinary subject, the course will cover basic concepts in theoretical computer science and physics in addition to introducing core quantum computing topics.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, PHYS274); and 1 course with a minimum grade of C- from (CMSC351, PHYS373).
Restriction: Permission of CMNS-Computer Science department.
Additional Information: No previous background in quantum mechanics is required.

CMSC460 Computational Methods (3 Credits)
Basic computational methods for interpolation, least squares, approximation, numerical quadrature, numerical solution of polynomial and transcendental equations, systems of linear equations and initial value problems for ordinary differential equations. Emphasis on methods and their computational properties rather than their analytic aspects. Intended primarily for students in the physical and engineering sciences.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461); and 1 course with a minimum grade of C- from (MATH241, MATH340); and 1 course with a minimum grade of C- from (CMSC106, CMSC131); and minimum grade of C- in MATH246. Also offered as: AMSC460.
Credit Only Granted for: AMSC460, AMSC466, CMSC460, or CMSC466.

CMSC466 Introduction to Numerical Analysis I (3 Credits)
Floating point computations, direct methods for linear systems, interpolation, solution of nonlinear equations.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461); and 1 course with a minimum grade of C- from (MATH241, MATH340); and 1 course with a minimum grade of C- from (CMSC106, CMSC131); and minimum grade of C- in MATH410. Also offered as: AMSC466.
Credit Only Granted for: AMSC460, CMSC460, AMSC466, or CMSC466.

CMSC470 Introduction to Natural Language Processing (3 Credits)
Introduction to fundamental techniques for automatically processing and generating natural language with computers. Machine learning techniques, models, and algorithms that enable computers to deal with the ambiguity and implicit structure of natural language. Application of these techniques in a series of assignments designed to address a core application such as question answering or machine translation.
Prerequisite: Minimum grade of C- in CMSC320, CMSC330, and CMSC351; and 1 course with a minimum grade of C- from (MATH240, MATH461).
Restriction: Permission of CMNS-Computer Science department.

CMSC472 Introduction to Deep Learning (3 Credits)
An introduction to deep learning, a machine learning technique, as well as its applications to a variety of domains. Provides a broad overview of deep learning concepts including neural networks, convolutional neural networks, recurrent neural networks, generative models, and deep reinforcement learning, and an intuitive introduction to basics of machine learning such as simple models, learning paradigms, optimization, overfitting, importance of data, and training caveats.
Prerequisite: Minimum grade of C- or higher in CMSC330 and CMSC351; and 1 course with a minimum grade of C- or higher from (MATH240, MATH461).
Restriction: Permission of the CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's) program.
Credit Only Granted for: CMSC498L or CMSC472.
Formerly: CMSC498L.

CMSC473 Capstone in Machine Learning (3 Credits)
Semester-long project course in which each student will identify and carry out a project related to machine learning, with the goal of publishing a research paper or software tool.
Prerequisite: Minimum grade of C- or higher in CMSC421 or CMSC422.
Recommended: Background or exposure to machine learning topics is strongly encouraged.
Restriction: Permission of instructor and Permission of CMSC - Computer Science department.
Credit Only Granted for: CMSC498P or CMSC473.
Formerly: CMSC498P.
Additional Information: Students will be paired with project advisors from the UMD faculty or alternatively, an industry advisor. Students are encouraged to plan for projects results that can be published at academic conferences or will impact academic research.

CMSC474 Introduction to Computational Game Theory (3 Credits)
Game theory deals with interactions among agents (either human or computerized) whose objectives and preferences may differ from the objectives and preferences of the other agents. It will also provide a comprehensive introduction to game theory, concentrating on its computational aspects.
Prerequisite: Minimum grade of C- in CMSC351 and CMSC330; and permission of CMNS-Computer Science department. Or must be in the (Computer Science (Doctoral), Computer Science (Master's)) program.
Credit Only Granted for: CMSC474, ECON414, GVPT390 or GVPT399A.

CMSC475 Combinatorics and Graph Theory (3 Credits)
General enumeration methods, difference equations, generating functions. Elements of graph theory, matrix representations of graphs, applications of graph theory to transport networks, matching theory and graphical algorithms.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461); and 1 course with a minimum grade of C- from (MATH241, MATH340). And permission of CMNS-Computer Science department; or permission of CMNS-Mathematics department. Cross-listed with MATH475 .

CMSC476 Introduction to Robotics with Perception (3 Credits)
Introduction to the programming of robots with perception. Topics covered include navigation using vision and 3D depth sensors, localization and map making, image processing for visual navigation and recognition, and basic vision and depth-based manipulation. Develop algorithms and learn how to use vision and software tools, such as Open CV, MoveIt, and the Point Cloud Library. Programming done in Python and C++ under the Robotic Operating System (ROS).
Prerequisite: Minimum grade of C- in MATH240, CMSC330, and CMSC351.
Restriction: Permission of CMNS-Computer Science department.

CMSC477 Robotics Perception and Planning (3 Credits)
A hands-on introduction to perception and planning for robotics, including rigid body transformations and rotations, dynamics and control of mobile robots/drones, graph based and sampling based planning algorithms, Bayseian and Kalman filtering, camera models and calibration, projective geometry, visual features, optical flow, pose estimation, RANSAC and Hough transform, structure from motion, visual odometry, machine learning basics, visual recognition and learning.
Prerequisite: MATH240; and (ENEE467 or CMSC420).
Restriction: Must be in the Robotics and Autonomous Systems minor; or permission of department.
Credit Only Granted for: CMSC477 or CMSC498F.
Formerly: CMSC498F.
Additional Information: Students in the Robotics and Autonomous Systems minor should take ENEE467 as a prerequisite; Computer Science students not in the minor should take CMSC420.

CMSC488 Special Topics in Computer Science (1-3 Credits)
Seminar courses that allow students to pursue new and emerging areas of Computer Science.
Restriction: Permission of CMNS-Computer Science department.
Repeatable to: 6 credits if content differs.
Additional Information: Course may be used as electives for the undergraduate degree and minor.

CMSC498 Selected Topics in Computer Science (1-3 Credits)
An individualized course designed to allow a student or students to pursue a selected topic not taught as a part of the regular course offerings under the supervision of a Computer Science faculty member. In addition, courses dealing with topics of special interest and/or new emerging areas of computer science will be offered with this number. Selected topics courses will be structured very much like a regular course with homework, project and exams. Credit according to work completed
Restriction: Permission of CMNS-Computer Science department.

CMSC499 Independent Undergraduate Research (1-3 Credits)
Students are provided with an opportunity to participate in a computer science research project under the guidance of a faculty advisor. Format varies. Students and supervising faculty member will agree to a research plan which must be approved by the department. As part of each research plan, students should produce a final paper delineating their contribution to the field.
Restriction: Must be in one of the following programs (Computer Science; Engineering: Computer) ; and permission of CMNS-Computer Science department.

CMSC601 Computational and Mathematical Analysis of Biological Networks across Scales (3 Credits)
Describe, implement and analyze algorithms that solve fundamental problems in biological network analysis: descriptive summaries of network structure and properties, probabilistic and dynamical network models, statistical models for networked data and network visualization.
Prerequisite: CMSC423; or equivalent.
Credit Only Granted for: CMSC828O or CMSC601.
Formerly: CMSC828O.

CMSC614 Computer and Network Security (3 Credits)
Advanced topics in computer and network security, including: anonymity, privacy, memory safety, malware, denial of service attacks, trusted hardware, security design principles, and empirically measuring security "in the wild". This will be a largely paper-driven course (there is no textbook), preparing students for research in (or around) the broad area of security. Students will gain first-hand experience launching attacks in controlled environments. The bulk of the grade will be based on a final, semester-long group project.
Recommended: Knowledge of C programming.
Restriction: Must be in the Computer Science Master's or Doctoral programs.
Credit Only Granted for: CMSC818O or CMSC614.
Formerly: CMSC818O.

CMSC630 Foundations of Software Verification (3 Credits)
Topics in program verification. Operational semantics of programs. Preconditions and postconditions. Axiomatic proof systems and predicate transformers. Temporal logic and model checking. Process algebra, semantic equivalences and algebraic reasoning.
Prerequisite: CMSC330; or students who have taken courses with comparable content may contact the department; or permission of instructor.

CMSC631 Program Analysis and Understanding (3 Credits)
Techniques for static analysis of source code and modern programming paradigms. Analysis techniques: data flow analysis, program dependence graphs, program slicing, abstract interpretation. The meaning of programs: denotational semantics, partial evaluation. Advanced treatment of abstraction mechanisms: polymorphic types, operation overloading, inheritance, object-oriented programming and ML-like programming languages.
Prerequisite: CMSC330; or students who have taken courses with comparable content may contact the department; or permission of instructor.

CMSC634 Empirical Research Methods for Computer Science (3 Credits)
A graduate-level introductory course on empirical reseach methods for computer scientists. Experimental techniques for evaluating software systems and processes, human performance using interfaces, programming environments, and software engineering methods. Introduction to constructs and methods of measurements, qualitative and quantitative design, quasi-experimental and non-experimental design, baseline design, and statistical analysis.
Recommended: An introductory statistics class.
Restriction: Must be in Computer Science (Master's) program; or must be in Computer Science (Doctoral) program; or permission of instructor.
Credit Only Granted for: CMSC838G (Fall2005) or CMSC634.

CMSC641 Principles of Data Science (3 Credits)
An introduction to the data science pipeline, i.e., the end-to-end process of going from unstructured, messy data to knowledge and actionable insights. Provides a broad overview of what data science means and systems and tools commonly used for data science, and illustrates the principles of data science through several case studies.
Restriction: Must be in one of the following programs: (Data Science Post-Baccalaureate Certificate, Master of Professional Studies in Data Science and Analytics, or Master of Professional Studies in Machine Learning). Cross-listed with: MSML602.
Credit Only Granted for: DATA602, MSML602 or CMSC641.
Formerly: CMSC641.

CMSC642 Big Data Systems (3 Credits)
An overview of data management systems for performing data science on large volumes of data, including relational databases, and NoSQL systems. The topics covered include: different types of data management systems, their pros and cons, how and when to use those systems, and best practices for data modeling.
Prerequisite: DATA602.
Restriction: Must be in the Data Science Post-Baccalaureate Certificate of Professional Studies or Master of Professional Studies in Data Science and Analytics program.
Credit Only Granted for: DATA605 or CMSC642.
Formerly: CMSC642.

CMSC643 Principles of Machine Learning (3 Credits)
A broad introduction to machine learning and statistical pattern recognition. Topics include: Supervised learning: Bayes decision theory, discriminant functions, maximum likelihood estimation, nearest neighbor rule, linear discriminant analysis, support vector machines, neural networks, deep learning networks. Unsupervised learning: clustering, dimensionality reduction, PCA, auto-encoders. The course will also discuss recent applications of machine learning, such as computer vision, data mining, autonomous navigation, and speech recognition.
Restriction: Must be in one of the following programs: (Data Science Post-Baccalaureate Certificate, Master of Professional Studies in Data Science and Analytics, or Master of Professional Studies in Machine Learning). Cross-listed with: MSML603.
Credit Only Granted for: DATA603, MSML603 or CMSC643.
Formerly: CMSC643.

CMSC644 Algorithms for Data Science (3 Credits)
Provides an in-depth understanding of some of the key data structures and algorithms essential for advanced data science. Topics include random sampling, graph algorithms, network science, data streams, and optimization.
Prerequisite: DATA602.
Restriction: Must be in the Data Science Post-Baccalaureate Certificate of Professional Studies or Master of Professional Studies in Data Science and Analytics program.
Credit Only Granted for: DATA606 or CMSC644.
Formerly: CMSC644.

CMSC651 Analysis of Algorithms (3 Credits)
Efficiency of algorithms, orders of magnitude, recurrence relations, lower-bound techniques, time and space resources, NP-complete problems, polynomial hierarchies, and approximation algorithms. Sorting, searching, set manipulation, graph theory, matrix multiplication, fast Fourier transform, pattern matching, and integer and polynomial arithmetic.
Prerequisite: CMSC451.

CMSC652 Complexity Theory (3 Credits)
This course will define what it means for a problem to be hard (or easy) in a variety of ways. The emphasis will be on natural problems. Topics may include NP-completeness, Sparse Sets, Graph Isomoprhism (why it is thought to not be NP-complete), Counting problems, and approximation problems.
Prerequisite: CMSC451 or CMSC452; or permission of instructor.
Credit Only Granted for: CMSC652 or CMSC858G.
Formerly: CMSC858G.

CMSC656 Introduction to Cryptography (3 Credits)
Introduction to modern cryptography. Topics include symmetric-key encryption, hash functions, message-authentication codes, block-cipher design, theoretical foundations, number theory, public-key encryption, and digital signatures.
Prerequisite: CMSC451, CMSC452, or CMSC456.
Credit Only Granted for: CMSC656 or CMSC858K.
Formerly: CMSC858K.

CMSC657 Introduction to Quantum Information Processing (3 Credits)
An introduction to the field of quantum information processing. Students will be prepared to pursue further study in quantum computing, quantum information theory, and related areas.
Prerequisite: Familiarity with complex numbers and basic concepts in linear algebra (e.g., eigenvalues, eigenvectors, Hermitian and unitary matrices) is required.
Credit Only Granted for: CMSC657 or CMSC858K.
Formerly: CMSC858K.
Additional Information: Previous background in quantum mechanics or theory of computation is not required.

CMSC660 Scientific Computing I (3 Credits)
Monte Carlo simulation, numerical linear algebra, nonlinear systems and continuation method, optimization, ordinary differential equations. Fundamental techniques in scientific computation with an introduction to the theory and software for each topic.
Prerequisite: Must have knowledge of C or Fortran. And CMSC466, AMSC466, AMSC460, or CMSC460; or (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Cross-listed with AMSC66 0.
Credit Only Granted for: AMSC660 or CMSC660.

CMSC661 Scientific Computing II (3 Credits)
Fourier and wavelet transform methods, numerical methods for elliptic partial differential equations, numerical linear algebra for sparse matrices, Finite element methods, numerical methods for time dependent partial differential equations. Techniques for scientific computation with an introduction to the theory and software for each topic. Course is part of a two course sequence (660 and 661), but can be taken independently.
Prerequisite: Must have knowledge of C or Fortran. And CMSC466, AMSC466, AMSC460, or CMSC460; or (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Cross-listed with: AMSC661.
Credit Only Granted for: AMSC661 or CMSC661.

CMSC662 Computer Organization and Programming for Scientific Computing (3 Credits)
This course presents fundamental issues of computer hardware, software parallel computing, and scientific data management for programming for scientific computation.
Prerequisite: Must have Knowledge of C or Fortran. And CMSC466, AMSC466, AMSC460, or CMSC460; or (must have knowledge of basic numerical analysis (linear equations, nonlinear equations, integration, interpolation); and permission of instructor). Cross-listed with AMSC66 2.
Credit Only Granted for: AMSC662 or CMSC662.

CMSC663 Advanced Scientific Computing I (3 Credits)
In the sequence Advanced Scientific Computing I & Advanced Scientific Computing II, (AMSC663/CMSC663 and AMSC664/CMSC664, respectively) students work on a year-long individual project to develop software for a scientific task in a high performance computing environment. Lectures will be given on available computational environments, code development, implementation of parallel algorithms.
Prerequisite: AMSC660 or CMSC660; and (AMSC661 or CMSC661).
Restriction: Permission of instructor. Cross-listed with AMSC663.
Credit Only Granted for: AMSC663 or CMSC663.

CMSC664 Advanced Scientific Computing II (3 Credits)
In the sequence Advanced Scientific Computing I & Advanced Scientific Computing II, (AMSC663/CMSC663 and AMSC664/CMSC664, respectively) students work on a year-long individual project to develop software for a scientific task in a high performance computing environment. Lectures will be given on available computational environments, code development, implementation of parallel algorithms.
Prerequisite: AMSC663 or CMSC663.
Restriction: Permission of instructor. Cross-listed with AMSC664.
Credit Only Granted for: AMSC664 or CMSC664.

CMSC666 Numerical Analysis I (3 Credits)
Approximation theory, numerical solution of initial-value problems, iterative methods for linear systems, optimization.
Prerequisite: CMSC466 or AMSC466; and MATH410. Cross-listed with: AMSC666.
Credit Only Granted for: AMSC666 or CMSC666.

CMSC673 Capstone in Machine Learning (3 Credits)
Semester-long project course in which each student will identify and carry out a project related to machine learning, with the goal of publishing a research paper or software tool.
Prerequisite: Minimum grade of C-in CMSC421 or CMSC422. Jointly offered with: CMSC473.
Credit Only Granted for: CMSC673, CMSC798P, CMSC473, or CMSC498P.
Formerly: CMSC798P.

CMSC701 Computational Genomics (3 Credits)
An introduction to the algorithms and heuristics used in the analysis of biological sequences. Includes an introduction to string matching and alignment algorithms, phylogenetic analysis, string reconstruction (genome assembly), and sequence pattern recognition (gene and motif finding). A particular emphasis will be placed on the design of efficient algorithms and on techniques for analyzing the time and space complexity of these algorithms. Computational concepts will be presented in the context of current biological applications. No prior knowledge of biology necessary.

CMSC702 Computational Systems Biology (3 Credits)
An introduction to the fundamental concepts in the computational analysis of biological systems with applications to: functional genomics, population genetics, interaction networks, epigenetics. Computational concepts convered: network and graph algorithms, machine learning, large data/network visualization, statistical modeling and inference, probabilistic graphical models, sparse methods in data analysis, numerical optimization. No prior knowledge of biology required.

CMSC703 Network Analysis and Modeling of Biological Systems (3 Credits)
An introduction to the computational network analysis and modeling of biological systems focusing on transcriptional, protein, signaling and metabolic networks (with primary emphasis on integrating the former within the latter). Computational methods studied for this type of analysis include: network and graph algorithms, network-based machine learning approaches, modeling dynamical systems, numerical optimization (linear, integer and quadratic programming) and a variety of other methods used to solve constraint based problems (primarily in the context of studying metabolic networks). These methods are complementary to those studied in CMSC701 and CMSC702.
Restriction: Must be in one of the following programs (Computer Science (Doctoral); Computer Science (Master's); Applied Mathematics and Scientific Computation (Doctoral); Applied Mathematics and Scientific Computation (Master's)) ; or permission of instructor.

CMSC711 Computer Networks (3 Credits)
Priciples, design, and performance evaluation of computer networks. Network architectures including the ISO model and local area networks (LANs). Communication protocols and network topology.
Prerequisite: CMSC412; or students who have taken courses with comparable content may contact the department.

CMSC712 Distributed Algorithms and Verification (3 Credits)
Study of algorithms from the distributed and concurrent systems literature. Formal approach to specifying, verifying, and deriving such algorithms. Areas selected from mutual exclusion, resource allocation, quiescence detection, election, Byzantine agreements, routing, network protocols, and fault-tolerence. Formal approaches will handle system specification and verification of safety, liveness, and real-time properties.

CMSC715 Wireless and Mobile Systems for the IoT (3 Credits)
Research on the Internet of Things (IoT), from the perspective of wireless networking and mobile sensing. Various techniques, algorithms, and systems that leverage the sensors in smartphones, smartwatches, drones, and IoT devices, to deliver real-world applications
Prerequisite: CMSC417.
Recommended: STAT100, MATH141, MATH240, and CMSC106; or equivalent courses.
Credit Only Granted for: CMSC818W or CMSC715.
Formerly: CMSC818W.

CMSC722 Artificial Intelligence Planning (3 Credits)
Automated planning of actions to accomplish some desired goals. Basic algorithms, important systems, and new directions in the field of artificial intelligence planning systems.
Prerequisite: CMSC421; or students who have taken courses with comparable content may contact the department; or permission of CMNS-Computer Science department.

CMSC723 Natural Language Processing (3 Credits)
Introduce fundamental concepts, techniques, and algorithms for the computational handling of natural language. Statistical and machine learning techniques, models, and algorithms that enable computers to deal with the ambiguity and implicit structure of human language. Approaches that focus on uncovering linguistic structure, such as syntactic or semantic parsing, as well as those that focus on manipulating text in useful ways, such as question answering or machine translation.
Prerequisite: Minimum grade of C- in CMSC422; and permission of CMNS-Computer Science department. Cross-listed with: INST735, LING723.
Credit Only Granted for: CMSC723, LING723, or INST735.
Additional Information: CMSC students may only receive PhD Comp. credit for CMSC723 or CMSC823, not both.

CMSC724 Database Management Systems (3 Credits)
Theoretical and implementation issues in advanced database systems. Topics include distributed databases, parallel databases, database client-server architectures, multimedia access methods, advanced query optimization techniques, data semantics and models, object-oriented databases, and deductive and expert database systems.
Restriction: Must be in one of the following programs (Computer Science (Master's); Computer Science (Doctoral)) ; or permission of instructor; or permission of CMNS-Computer Science department.

CMSC725 Geographical Information Systems and Spatial Databases (3 Credits)
Topics in geographic information systems and spatial databases. Integrates related results from databases, cartography, geography, computer graphics, file access methods, computational geometry, image processing, data structures, and programming languages. Topics include: cartographic modeling, principles of cartography, methods from computational geometry, principles of spatial databases, access methods, and spatial data structures. The architecture of some existing spatial databases and geographic information systems will be examined in greater detail.
Prerequisite: CMSC424 and CMSC420; or permission of instructor.

CMSC726 Machine Learning (3 Credits)
An introduction to modern statistical data analysis using machine learning techniques. The course quickly surveys elementary statistical models (decision trees, nearest neighbors and linear regression) and moves on to more complex algorithms such as support vector machines, boosting, neural networks, structured prediction, apprenticeship learning, online learning, bandits, recommender systems and reinforcement learning. Throughout an emphasis is placed on mathematical rigor.
Prerequisite: CMSC421 or CMSC422; or students who have taken courses with comparable content may contact the department; or permission of instructor.

CMSC727 Neural Modeling (3 Credits)
Fundamental methods of neural modeling. Surveys historical development and recent research results from both the computational and dynamical systems perspective. Logical neurons, perceptrons, linear adaptive networks, attractor neural networks, competitive activation methods, error back-propagation, self-organizing maps, and related topics. Applications in artificial intelligence, cognitive science, and neuroscience.
Prerequisite: CMSC421; or students who have taken courses with comparable content may contact the department; or permission of instructor.

CMSC730 Interactive Technologies in Human-Computer Interaction (3 Credits)
Ubiquitous and mobile computing, wearables, virtual/augmented reality, natural user interfaces, tangible UIs, interactive fabrication.
Restriction: Must be in the Computer Science Master's or Doctoral program; or permission of instructor.
Credit Only Granted for: CMSC838J or CMSC730.
Formerly: CMSC838J.

CMSC732 Human Factors in Security and Privacy (3 Credits)
Introducing a variety of important topics at the intersection of human factors and privacy and security, and developing skills in designing human-subjects studies to evaluate problems and solutions related to these topics.
Recommended: Previous coursework in human-computer interaction, security and privacy.
Credit Only Granted for: CMSC818D or CMSC732.
Formerly: CMSC818D.

CMSC733 Computer Processing of Pictorial Information (3 Credits)
Input, output, and storage of pictorial information. Pictures as information sources, efficient encoding, sampling, quantization, approximation. Position-invariant operations on pictures, digital and optical implementations, the pax language, applications to matched and spatial frequency filtering. Picture quality, image enhancement and image restoration. Picture properties and pictorial pattern recognition. Processing of complex pictures; figure extraction, properties of figures. Data structures for pictures description and manipulation; picture languages. Graphics systems for alphanumeric and other symbols, line drawings of two- and three-dimensional objects, cartoons and movies.
Prerequisite: CMSC420.

CMSC734 Information Visualization (3 Credits)
Information visualization defined in relation to graphics, scientific visualization, databases, data mining, and human-computer interaction. Visualizations for dimensional, temporal, hierarchical and network data. Examines design alternatives, algorithms and data structures, coordinated views, and human factors evaluations of efficacy.
Prerequisite: CMSC434; or students who have taken courses with comparable content may contact the department; or permission of instructor.

CMSC737 Fundamentals of Software Testing (3 Credits)
Examine fundamental software testing and related program analysis techniques. In particular, the important phases of testing will be reviewed, emphasizing th significance of each phase when testing different types of software. Concepts include: test generation, oracles, prioritization and coverage, regression and mutation testing, and program analysis.
Prerequisite: CMSC435; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Formerly: CMSC838M.

CMSC740 Advanced Computer Graphics (3 Credits)
An introduction to the principles of computer graphics. Includes an introduction to graphics displays and systems, introduction to the mathematics of affine and projective transformations, perspective, curve and surface modeling, algorithms for hidden-surface removal, color models, methods for modeling illumination, shading, and reflection.
Prerequisite: MATH240 and CMSC420; or permission of instructor.

CMSC742 Algorithms in Machine Learning: Guarantees and Analyses (3 Credits)
Machine learning studies automatic methods for learning to make accurate predictions, to understand patterns in observed features and to make useful decisions based on past observations. This course introduces theoretical machine learning, including mathematical models of machine learning, and the design and rigorous analysis of learning algorithms. Topics include: (1) Learning theory (traditional and modern), including PAC learning basics, Boosting theory and PAC learning in neural nets. (2) Latent variable graphical models, including spectral methods for learning latent variable models. (3) Reinforcement learning theory, including algorithms, sample complexity and analyses.
Prerequisite: CMSC422 or equivalent; or permission of instructor.
Credit Only Granted for: CMSC828U or CMSC732.
Formerly: CMSC828U.

CMSC751 Parallel Algorithms (3 Credits)
A presentation of the theory of parallel computers and parallel processing. Models of parallel processing and the relationships between these models. Techniques for the design and analysis of efficient parallel algorithms including parallel prefix, searching, sorting, graph problems, and algebraic problems. Theoretical limits of parallelism.
Prerequisite: CMSC451; or ENEE641; or students who have taken courses with comparable content may contact the department. Jointly offered wit h ENEE651.
Credit Only Granted for: ENEE651, ENEE759K or CMSC751.

CMSC752 Ramsey Theory and its Applications (3 Credits)
Theorems about when a coloring of a graph (or other objects) has to yield a nice monochromatic object. Applications will be to computer science theory and to mathematics.
Prerequisite: Any CMSC45X course or any 400-level math course.
Credit Only Granted for: CMSC858R or CMSC752.
Formerly: CMSC858R.

CMSC754 Computational Geometry (3 Credits)
Introduction to algorithms and data structures for computational problems in discrete geometry (for points, lines, and polygons) primarily in two and three dimensions. Topics include triangulations and planar subdivisions, geometric search and intersection, convex hulls, Voronoi diagrams, Delaunay triangulations, line arrangements, visibility, and motion planning.
Prerequisite: CMSC451 and CMSC420; or permission of instructor.

CMSC756 Robotics (3 Credits)
Overview on fundamental components of robotic systems, including the sensing and actuation, control and modeling of motion and perception, dynamics and kinematics, motion planning and manipulation of robots.
Prerequisite: CMSC420, CMSC106, CMSC466, and MATH240; or equivalent.
Restriction: Must be in the Computer Science Master's or Doctoral programs.
Credit Only Granted for: CMSC818N or CMSC756.
Formerly: CMSC818N.

CMSC763 Advanced Linear Numerical Analysis (3 Credits)
Advanced topics in numerical linear algebra, such as dense eigenvalue problems, sparse elimination, iterative methods, and other topics.
Prerequisite: AMSC666 or CMSC666; or permission of instructor. Also offered as: AMSC763.
Credit Only Granted for: AMSC600, AMSC763, CMSC760, or CMSC763.
Formerly: AMSC600 and CMSC760.

CMSC764 Advanced Numerical Optimization (3 Credits)
Modern numerical methods for solving unconstrained and constrained nonlinear optimization problems in finite dimensions. Design of computational algorithms and the analysis of their properties.
Prerequisite: MATH410; or permission of instructor. Jointly offered wit h AMSC607.
Credit Only Granted for: AMSC607 or CMSC764.
Formerly: CMSC878O.

CMSC773 Computational Linguistics II (3 Credits)
Natural language processing with a focus on corpus-based statistical techniques. Topics inlcude: stochastic language modeling, smoothing, noisy channel models, probabilistic grammars and parsing; lexical acquisition, similarity-based methods, word sense disambiguation, statistical methods in NLP applications; system evaluation.
Prerequisite: CMSC723, INST735, or LING723; or permission of instructor. Cross-listed with LING773, INST736.
Credit Only Granted for: CMSC773, LING773, or INST736.
Additional Information: CMSC students may only receive PhD Comp. credit for CMSC723 or CMSC823, not both.

CMSC798 Master's Non-Thesis Research (1-3 Credits)
Restriction: Permission of CMNS-Computer Science department.
Repeatable to: 6 credits.

CMSC799 Master's Thesis Research (1-6 Credits)

CMSC800 How to Conduct Great Research (1 Credit)
Develop research skills so as to promote high quality and high impact.
Restriction: Must be in the Computer Science doctoral program.
Credit Only Granted for: CMSC798F or CMSC800.
Formerly: CMSC798F.

CMSC801 Department Internal Research Seminar (1 Credit)
Research overviews from faculty to help introduce departmental research to graduate students.
Credit Only Granted for: CMSC798E or CMSC801.
Formerly: CMSC798E.

CMSC818 Advanced Topics in Computer Systems (1-3 Credits)
Advanced topics selected by the faculty from the literature of computer systems to suit the interest and background of students.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

CMSC828 Advanced Topics in Information Processing (1-3 Credits)
Advanced topics selected by the faculty from the literature of information processing to suit the interest and background of students.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

CMSC829 Advanced Topics in Bioinformatics and Computational Biology (3 Credits)
Advanced topics selected by the faculty from the literature of bioinformatics to suit the interest and background of students.

CMSC838 Advanced Topics in Programming Languages (1-3 Credits)
Advanced topics selected by faculty from the literature of programming languages to suit the interest and background of students.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

CMSC858 Advanced Topics in Theory of Computing (1-3 Credits)
Advanced topics selected by the faculty from the literature of theory of computing to suit the interest and background of students.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

CMSC878 Advanced Topics in Numerical Methods (1-3 Credits)
Advanced topics selected by the faculty from the literature of numerical methods to suit the interest and background of students.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

CMSC898 Pre-Candidacy Research (1-8 Credits)
Advanced topics selected by the faculty from the literature of applications of computer science to suit the interest and background of students.
Restriction: Permission of instructor.

CMSC899 Doctoral Dissertation Research (1-8 Credits)

COMM - Communication

COMM400 Research Methods in Communication (3 Credits)
Philosophy of scientific method; role of theory; research ethics; empirical research methods (measurement, sampling, design, analysis).
Prerequisite: COMM250; and must have an introductory course in statistics.
Restriction: Must be in Communication program.
Credit Only Granted for: COMM400 or COMM307.

COMM401 Interpreting Strategic Discourse (3 Credits)
Principles and approaches for practical analysis of discourse designed to shape audience opinion.
Prerequisite: COMM250.
Restriction: Must be in Communication program.

COMM402 Communication Theory and Process (3 Credits)
Philosophical and conceptual analysis of communication theories.
Prerequisite: COMM250.
Restriction: Must be in Communication program.

COMM419 Special Topics in Health Communication (3 Credits)
Covers a variety of topics of health communication. Blends theoretical concepts and practical concerns that impact upon health communication processes. This course covers a specific topic of health communication in greater depth and applies scholarly discoveries to real-world examples.
Prerequisite: COMM304.
Restriction: Must be in the Communication Major.
Repeatable to: 6 credits if content differs.

COMM420 Theories of Group Discussion (3 Credits)
Current theory, research and techniques regarding small group process, group dynamics, leadership and decision-making.

COMM421 Communicating Leadership (3 Credits)
Examines the nature of leadership, theories of leadership from a communication perspective, relationships between leadership, authority, power, and ethics. Explores leadership responsibilities, commitments, and actions.

COMM422 Communication Management (3 Credits)
Communication policies, plans, channels, and practices in the management of the communication function in organizations.

COMM423 Communication Processes in Conferences (3 Credits)
Group participation in conferences, methods of problem solving, semantic aspects of language, and the function of conferences in business, industry and government settings.

COMM424 Communication in Complex Organizations (3 Credits)
Structure and function of communication within organizations: organizational climate and culture, information flow, networks and role relationships.

COMM425 Negotiation and Conflict Management (3 Credits)
Role of communication in shaping negotiation and conflict processes and outcomes.

COMM426 Conflict Management (3 Credits)
Role of communication in managing conflict processes.
Recommended: COMM425 and COMM250.

COMM427 Crisis Communication (3 Credits)
Explores theories and research related to communication before, during, and after a crisis. Students examine the fundamentals of organizational communication, crisis management, and strategic and crisis communication planning before examining case studies of a number of real-life crises: organizational crises, natural disasters, accidents, terrorism incidents, health crises, and major crises of credibility.

COMM428 Special Topics Seminar in Dialogues and Deliberation (3 Credits)
A study in public dialogue and deliberation theory and practice. This course will integrate recorded lectures, readings, videos, Public Dialogues, teamwork, and historical research.
Prerequisite: COMM250; and must have completed or be concurrently enrolled in COMM306.
Restriction: Must be in the Communication Major.
Repeatable to: 6 credits if content differs.

COMM435 Theories of Interpersonal Communication (3 Credits)
Major theoretical approaches and research trends in the study of interpersonal communication.
Prerequisite: COMM400; or permission of ARHU-Communication department.

COMM436 Interpersonal Arguing (3 Credits)
An examination of face to face arguing.
Prerequisite: COMM400 and COMM250.
Restriction: Must be in Communication program.
Credit Only Granted for: COMM436 or COMM498I.
Formerly: COMM498I.

COMM448 Special Topics in Public Relations (3 Credits)
Courses seek to examine historical and current communication management theories, literature and practices for the purposes of understanding the business environment in which public relations/communication management operates and applying the best of these theories and practices toward the management of the public relations/communications functions of an organization.
Prerequisite: COMM201.
Restriction: Must be in the Communication Major.
Repeatable to: 6 credits if content differs.

COMM449 Special Topics in Digital Communication (3 Credits)
Explores the topics that have arisen around computers, digital technologies, the internet, big data, surveillance capitalism, and network infrastructures.
Repeatable to: 6 credits if content differs.

COMM450 Ancient and Medieval Rhetorical Theory (3 Credits)
A survey of rhetorical theory in the ancient and medieval periods. Emphasis is placed on the theoretical problems that gave rise to its development within both periods. Authors include Isocrates, Plato, Aristotle, Cicero, Quintilian, Hermogenes, Martianus Capella, Aurelius Augustine, Alberic of Monte Cassino, Geoffrey of Vinsauf and Robert of Basevorn.
Prerequisite: COMM250.
Restriction: Must be in Communication program.
Credit Only Granted for: COMM450 or COMM650.

COMM454 Rhetoric of the 1960s (3 Credits)
Study of key rhetoric of the 1960s. Treats rhetoric of relevant Presidents and several protest movements including civil rights, anti-war, and women's liberation. Contrasts traditional modes of argument with alternative rhetorical forms.
Prerequisite: COMM301.

COMM455 Speechwriting (3 Credits)
The study of message strategies in order to research and develop effective speech texts appropriate to speakers and their audiences in various public contexts.

COMM458 Seminar in Political Communication (3 Credits)
The examination of special topics for and theories of political communication.
Prerequisite: COMM250.
Repeatable to: 6 credits if content differs.

COMM459 Special Topics in Science Communication (3 Credits)
This seminar course is designed to help students learn a variety of topics of science communication.
Repeatable to: 6 credits if content differs.

COMM460 Public Life in American Communities, 1634-1900 (3 Credits)
Ways that Americans have used their voice to create public life. Focus is on the diverse social communities that have characterized American life and the place and characteristics of oral discourse in each.

COMM461 Voices of Public Leadership in the Twentieth Century (3 Credits)
Study of the use of speaking in the power struggles of the twentieth century. Focus is on important speakers of the century, their social and policy influence, and the struggle to expand the diversity of voices with power in the public sphere.

COMM462 Visual Communication (3 Credits)
The study of visual communication should change the way one sees the world. Students will observe, analyze, and critique visual images. The ascendance of images in our contemporary world will be demonstrated, methods for critically comprehending how images do persuasive work will be identified, and students will develop a vocabulary for critiquing images, and assist students in creating compelling images.
Credit Only Granted for: COMM462 or COMM498V.
Formerly: COMM498V.

COMM468 Seminar in Mediated Communication (3 Credits)
The examination of special topics related to the study of mediated communication.
Prerequisite: COMM402, COMM450, COMM350, or JOUR350.
Restriction: Junior standing or higher.
Repeatable to: 6 credits if content differs.

COMM469 The Discourse of Social Movements (3 Credits)
Study of key social movements that have influenced American social and political life. In alternate years the Civil Rights Movement and the Rhetoric of Women's Suffrage and Abolitionism. Consideration of how groups excluded from or marginalized in American political life affect social change.
Recommended: COMM301.
Restriction: Junior standing or higher.
Repeatable to: 6 credits if content differs.

COMM470 Listening (3 Credits)
The principles of listening behavior.

COMM471 Public Communication Campaigns (3 Credits)
Diffusion theory and its implications for public communication campaigns.
Prerequisite: COMM200; or permission of ARHU-Communication department.

COMM472 Nonverbal Communication (3 Credits)
Nonverbal communication in human interaction theory and research on proxemics, kinesics and paralanguage as expression of relationship, affect and orientation within and across cultures.

COMM475 Persuasion (3 Credits)
Bases of persuasion, with emphasis on recent experimental developments in persuasion.

COMM476 Language, Communication, and Action (3 Credits)
Communication as symbolic action through the study of communication ethics. Emerging ethical principles and decision-making in public discourse, interpersonal communication, organizational communication, public relations, health communication, and crisis communication.
Restriction: Must be in the Communication major.

COMM477 Discourse Analysis (3 Credits)
Concepts of textual and discourse analysis applied to speech situations.

COMM478 Communication Colloquium (1 Credit)
Current trends and issues in the field of communication, stressing recent research methods. Recommended for senior and graduate student majors and minors in communication.
Repeatable to: 4 credits if content differs.

COMM482 Intercultural Communication (3 Credits)
The major variables of communication in an intercultural context: cultural, racial and national differences; stereotypes; values; cultural assumptions; and verbal and nonverbal channels.

COMM483 Senior Seminar in Public Relations (3 Credits)
Integration of theory, techniques and research methods into the planning and execution of public relations campaigns for specific organizations. Analysis of research on the case studies of public relations.
Prerequisite: COMM351; and 1 course from (COMM305, COMM306, COMM307, or COMM400).
Additional Information: Students who enrolled after Fall 2020 should not take COMM400 as a prerequisite.

COMM488 Communication Portfolio Project (1 Credit)
Preparation of the professional communication portfolio.
Restriction: Senior standing; and must be in Communication program.
Repeatable to: 3 credits if content differs.

COMM489 Topical Research (1-3 Credits)
Individualized research projects conducted with a faculty sponsor.
Prerequisite: Permission of ARHU-Communication department.
Repeatable to: 6 credits if content differs.

COMM498 Seminar (3 Credits)
Present-day communication research.
Restriction: Permission of instructor; and senior standing.

COMM600 Empirical Research in Communication (3 Credits)
Formerly: SPCH600.

COMM601 Historical-Critical Research in Communication (3 Credits)
Intense study in critical and historical methodology as applicable to research in communication. Emphasis will be placed on the composition and the evaluation of historical-critical studies of significance in the field of rhetorical communication scholarship.
Formerly: SPCH601.

COMM602 Communication Theory (3 Credits)
Fundamental concepts, approaches, and problems in communication theory.
Restriction: Must be in one of the following programs (Communication (Master's); Communication (Doctoral)).

COMM604 Argumentation Theory (3 Credits)
Fundamental concepts, approaches, and problems in argumentation theory.

COMM606 Seminar in Communication Management (3 Credits)
Communication and public relations as a managed function of organizations are introduced. Students learn how managing communication contributes to organizational effectiveness. Using organizational theory, theories of Excellence in public relations and communication management, communication metrics and communication ethics, students build their communication strategic management skills beyond the programmatic level to the functional and organizational levels of decision-making.
Restriction: Restricted to GCPS (Z045) in Communication; or must be in Public Management-Executive Masters (Master's) program.

COMM607 Seminar in Communication Management Publics (3 Credits)
Research and analysis of publics and how the use of this information builds more effective relationships with strategic constituencies of organizations are emphasized. Students learn and apply to communication management problems the theories of audience segmentation, stakeholders, behavior of activist organizations, conflict resolution, environmental scanning, ethics of organization-public relationships and the situational theory of publics.
Restriction: Restricted to GCPS (Z045) in Communication; or must be in Public Management-Executive Masters (Master's) program.

COMM609 Fundamentals of Interpreting (1-6 Credits)
Develops a systematic, reflective approach to interpreting tasks in real-world settings and outlines the use of different modes of interpreting under professional working conditions. Provides an overview of interpreting skills with exercises to develop them, including focus on active listening and analysis, effective use of memory, and delivery of the target message. Interpreting strategies and techniques in both dialogue and formal consecutive settings are discussed and practiced in a range of interpreting domains. Includes sight translation.
Prerequisite: Students must complete an admissions test for first year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits.

COMM610 Introduction to Translation and Interpreting Studies (3 Credits)
Provides an overview of the interdisciplinary fields of Translation and Interpreting Studies and establishes relationships between scholarly study and professional practice. Examines how theories and concepts inform practice, guide to a higher level of competence, and address issues of interlingual, intercultural mediation in authentic, real-world settings both past and present. serves as a foundation course for reflective practice and portfolio work through action research methodology and process
Prerequisite: Students must complete an admissions test for first year courses; and permission of ARHU-Communication department.

COMM611 Semniar in Global Communcation Mangement (3 Credits)
Global Communication Management extends the theories of communication management developed in COMM606 and COMM607 to a global level. Students move beyond Western communication management assumptions to examine how practices of communication management differ in different national and/or cultural contexts. Students are challenged to build generic principles of communication management with specific applications that can be used and adapted in the differing countries and cultures of the world whether working in multinational corporations, national governments, or non-governmental organizations (NGO's).
Restriction: Restricted to GCPS (Z045) in Communication; or must be in Public Management-Executive Masters (Master's) program.

COMM618 Professional Communication: Rhetoric & Style (3 Credits)
Writing instruction in English for professional communicators with a focus on rhetoric, style, and grammar. Designed to teach English writing skills focused on message creation and organization, sentence structure, and language use, typologies of rhetorical genres, registers, and style, research skills, summary-writing skills, to editing skills, and vocabulary building in English writing.
Repeatable to: 6 credits.

COMM619 Consecutive Interpretation (1-6 Credits)
Builds upon the systematic, reflective approach to interpreting in real-world settings introduced in Fundamentals of Interpreting. Consecutive interpreting skills are consolidated through individual and group practice, and any remaining challenges related to consecutive interpreting sub-skills are identified and addressed. Stresses effective analysis, note-taking, and use of voice during exercises in sight translation, dialogue, and formal consecutive interpreting.
Prerequisite: COMM609; and must have completed an admissions test for first year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits.

COMM628 Organization Communication: Research and Intervention (3 Credits)
The role of the internal and external communication consultant as an organizational change-agent. Emphasis upon data gathered to facilitate the communication development of the organization.
Prerequisite: COMM424; or permission of instructor.
Repeatable to: 6 credits if content differs.
Formerly: SPCH628.

COMM629 Introduction to Simultaneous Interpretation (1 Credit)
Builds upon the overview of the simultaneous mode in Fundamentals of Interpreting by reviewing the relationship between consecutive and simultaneous skills and introducing work in the booth. Challenges of simultaneous interpreting, including split attention, ear-voice span, and voice and microphone technique are addressed. Participants become familiar with the booth and exercises required to build simultaneous skills. Role and use of portable equipment in professional settings are discussed. Recommended as preparation for the M.A. entrance examination.
Prerequisite: Admissions test for Graduate Certificate in Interpreting; and COMM609; and permission of ARHU-Communication department.
Recommended: COMM619.
Repeatable to: 3 credits if content differs.

COMM630 Seminar in Public Relations Management (3 Credits)
Relationship of public relations management to organizational structure and communication functions. Objectives, planning, staffing, budgeting, administering, and evaluation of public relations programs.
Credit Only Granted for: COMM630 or JOUR630.
Formerly: JOUR630.

COMM631 Seminar in Public Relations Publics (3 Credits)
Analysis of public relations programs aimed at organizational publics. Media, issue-related, community, employee, governmental, consumer, financial, and student/educator publics. Theories of the nature of publics, communication behavior of publics, and effects of public relations programs aimed at different publics.
Credit Only Granted for: COMM631 or JOUR631.
Formerly: JOUR631.

COMM633 Global Public Relations (3 Credits)
Application of principles of public relations to countries or regions with different cultures, political systems, economic systems, levels of development, media systems, and levels of activism.
Credit Only Granted for: COMM633 or JOUR633.
Formerly: JOUR633.

COMM637 Professional Practice Forum in Translation: Career Portfolio and Exams (1 Credit)
Serves as final preparation for entry into the profession through development of career portfolio to meet summative degree requirement and development of strategies for gaining work as a professional translator. Prepares participants for degree examinations and employer tests through the review of previous exam material and employer testing requirements. Serves as venue for degree examinations, career goal setting and planning for future employment. Participants present and defend career portfolio as summative requirement for MA in translation; MA in Trans. and Localization Project.
Prerequisite: Admissions test for second year courses; and (COMM659 and COMM679); and permission of ARHU-Communication department.

COMM638 Professional Communication: Rhetoric & Voice (3 Credits)
A skills-based course in speaking instruction in English for professional communicators with a focus on public speaking, voice, diction, and pronunciation. Focuses on developing public speaking, voice, diction, and pronunciation skills. Designed to teach message creation and organization, sentence structure, and language use, vocal qualities designed to enhance proper pronunciation, breathing, and articulation skills, register variation, listening skills, English vocabulary, audience adaptation skills with attention to cultural distinctions, presentational skills with visual aids, and interpretive skills.
Repeatable to: 6 credits.

COMM639 Fundamentals of Translation (1-6 Credits)
Develops a systematic, reflective approach to translation involving both the written and spoken word. Provides an overview of domains of translation, associated text categories and translation tasks. Develops strategies to identify, analyze and resolve translation challenges in specific, authentic,real-world contexts. Working with a series of current texts, explores general translation concepts and language-specific strategies. Includes sight translation exercises and introduction to translation resources and computer tools used in the translators workplace.
Prerequisite: Admissions test for first year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits if content differs.

COMM641 Introduction to Computer-Assisted Translation (1 Credit)
Introduces the use of computer-assisted translation tools to support large-scale translation projects and streamline translation processes. Focuses on industry software products that utilize translation memory and terminology management systems. Discusses the role of tools in the entire translation process from pre- to post-editing.
Prerequisite: Admissions test for first year courses; and COMM639; and permission of ARHU-Communication department.

COMM649 Translation for Specific Domains (1-6 Credits)
Builds upon the systematic, reflective approach introduced in Fundamentals of Translation by addressing the development of translation skills required for specialization in specific domains. In written and sight translation exercises include researching specialized subject material, developing and maintaining terminology, and consulting experts in the field. Includes authentic, real-world translation projects in translation teams. Overview of computer-assisted translation tools and continued work on sight translation enable higher levels of productivity under time constraints.
Prerequisite: Admissions test for first year courses; and COMM639; and permission of ARHU-Communication department.
Repeatable to: 8 credits if content differs.

COMM652 Contemporary Rhetorical Theory (3 Credits)
A study of twentieth century theories of rhetoric. Special attention will be devoted to Richard Weaver, Kenneth Burke, Lloyd Bitzer, Ernest Bormann, Walter Fisher, and the continental theorists of communication such as Chaim Perelman and Jurgen Habermas.
Formerly: SPCH652.

COMM655 Seminar in Speechwriting (3 Credits)
Theoretical and practical aspects of speechwriting at an advanced level.
Formerly: SPCH655.

COMM657 Professional Practice Forum in Interpreting: Career Portfolio and Exams (1 Credit)
Serves as final preparation for entry into the profession through development of strategies for gaining work as a professional translator. Prepares participants for degree examinations and employer tests through the review of previous exam material and employer testing requirements. Serves as venue for degree examinations, career goal setting and planning for future employment. Participants present and defend career portfolio and summative requirement for degree.
Prerequisite: COMM719, COMM769, and COMM729; and admissions test for second-year courses; and permission of ARHU-Communication department.

COMM659 Translation for Language-Specific Markets (1-3 Credits)
Builds translation skills to a highly professional level by developing autonomy in completing authentic, real-world translation projects based upon the reflective approach developed in the first-year curriculum. Develops one or more specializations. Completion of individual and group projects covering all aspects of professional translation from subject matter research, terminology work, and use of computer-assisted translation tools. Sight translation and timed exercises to increase production and meet deadlines.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits.

COMM661 Communication and Social Change (3 Credits)
Place of rhetoric as the union of the moral and historical in moments of social definition. Reviews theories of discourse in social change including political change, social movements, consciousness change, and more global change. Application to contemporary change.

COMM668 Risk Communication (3 Credits)
Principles and approaches to risk communication. Emphasis is placed on theoretical trends in risk communication and application to industry. Topics include how to be an effective source of risk communication, understanding audiences, handling the media and designing messages.
Prerequisite: Permission of ARHU-Communication department.
Repeatable to: 9 credits if content differs.

COMM669 Professional Practice Forum in Translation: Practicum (1-3 Credits)
Provides opportunities to complete real-world translation projects on campus and in the public service, legal, business, and political communities as translators, project managers and translators/reviewers working on group projects. Collaboration with participants in the interpreting practicum is also sought to prepare multilingual texts for practicum events and familiarize participants with conference translation. Complements Translation for Specific Markets, and practicum projects are included in course and career reflective practice portfolios. Requires independent study plan agreed with course instructor.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.
Repeatable to: 9 credits if content differs.

COMM679 Professional Practice Forum in Translation: Workplace Processes and Procedures (1 Credit)
Provides in-depth exploration of processes and procedures in public service, legal, and political settings requiring translation services. Prepares for translation in real-world settings by discussing procedures across sectors and institutions, enabling informed career plans and choices. Discusses ethics, professional conduct and business practices. Reinforces identity as a professional translator, develops specializations, and pursues professional and career development opportunities through interaction with members of the profession, professional organizations, and institutions in the language industry.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.
Repeatable to: 3 credits if content differs.

COMM680 Communication Programs in Education and Training (3 Credits)
An analysis of instructional development in communication. Instructional objectives, strategies and evaluation are applied to educational, corporate and industrial training programs.
Formerly: SPCH680.

COMM681 Communication Issues in Human Resource Development (3 Credits)
Research in and theory of contemporary communication issues in the human resource development of governmental, corporate, business organizations.
Formerly: SPCH681.

COMM683 Intercultural Communication Theory (3 Credits)
An in-depth coverage of the essential theories of intercultural communication is provided.

COMM686 Teaching Communication (1 Credit)
Principles of effective teaching--content and process--in the college communication classroom.
Formerly: SPCH686.

COMM687 Professional Development in the Communication Discipline (1 Credit)
Knowledge and skills required for advancement as an academic professional in the communication discipline. Topics include types of academic institutions and posts, elements of academic performance, documentation of professional qualifications, how academic posts are secured, processes associated with tenure and promotion, processes of academic publication and history of the discipline.

COMM688 Communication Field Experience (1-6 Credits)
Applications of communication principles and research in professional communication settings.
Restriction: Permission of instructor.
Formerly: SPCH688.

COMM698 Special Problems in Communication (1-3 Credits)
Formerly: SPCH698.

COMM700 Introduction to Graduate Study in Communication (3 Credits)
Basic skills in communication research.
Restriction: Must be in Communication (Doctoral) program.
Formerly: SPCH700.

COMM701 Quantitative Methods in Communication Research (3 Credits)
Logic and methods of quantitative data collection and statistical analysis as applied to communication studies. Research strategies for communications: experimentation, survey research, field research, and content analysis.
Prerequisite: COMM700.
Formerly: SPCH701.

COMM703 Advanced Quantitative Data Analysis in Communication Research: Structural Equation Models (3 Credits)
Model evaluation and theory construction in communication research. Causal systems in current communication research: recursive, nonrecursive, and unobserved variable models. Students must have a dissertation research project requiring quantitative methods.
Prerequisite: COMM702.
Restriction: Permission of instructor.
Formerly: SPCH703.

COMM708 Professional Communication: Rhetoric and Context (3 Credits)
A skills-based course in speaking and writing in English for professional communicators adapting to a diversity of contexts, including business, health, law, politics, and science. Focus on diversifying the different contexts in which speaking and writing take place. Designed to develop an ability to adapt messages to a diversity of professional communication contexts, address the role of culture in adapting messages to a diversity of professional communication contexts, hone English speaking and writing skills based on a diversity of language registers, gain experience working with technical vocabulary, enhance analytical skills, strengthen research skills, enhance critical thinking skills, develop software technology skills.
Repeatable to: 6 credits.

COMM710 Translation and Localization Project Management (3 Credits)
Introduces basic principles of project management in the translation industry based upon globalization and localization processes for software, websites, and other translation-driven products. Focuses on information technology and workflow in large-scale multilingual projects. Examines planning, execution, and evaluation processes grounded in best practices and standards of the translation and localization industry.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.

COMM711 Historical/Critical Methods in Communication Research (3 Credits)
Methods for historical and critical research in communication. Formulation of significant research questions, systematic collection of bibliographic and phenomenal information, formulating substantial claims, organizing and writing research for disciplinary outlets.
Prerequisite: COMM700; or permission of instructor.
Formerly: SPCH711.

COMM712 Advanced Historical/Critical Methods in Communication Research (3 Credits)
Critical assessment of qualitative approaches to communication. Introduction to significant schools of historical and critical research. Advanced techniques for inquiry and manuscript preparation. Students must have dissertation research project requiring historical or critical method.
Restriction: Permission of instructor.

COMM713 Translation Technology (3 Credits)
Builds upon the principles outlined in Introduction to Computer-Assisted Translation to develop comprehensive knowledge of the current and future roles of technology in translation processes involving both the spoken and the written word, including use of widely available software tools and systems for terminology management, translation memory, and machine translation. Students carry out projects using translation technology, enabling them to apply newly acquired knowledge in applied contexts. Examination of case studies highlights how translation technology is leveraged across public and private sector organizations and the latest developments in the field.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.

COMM714 Introduction to Qualitative Methods in Communication Research (3 Credits)
Methods for field research in communication including interiewing, ethnographic and participant intervention, focus groups, and content analysis. Formulation of significant research questions, systematic collection of field data, formulating substantial claims from the research, organizing and writing research from disciplinary outlets.
Restriction: Permission of instructor.

COMM715 Advanced Qualitative Methods in Communication Research (3 Credits)
Advanced data analysis of qualitative data in Communication research. In-field research and techniques for analysis of data from in-field work.

COMM718 Practicum in Research Proposal and Design (3 Credits)
Development of research proposal through research team interaction. In different semester the course focuses on different subdisciplines of communication.
Repeatable to: 6 credits.
Credit Only Granted for: COMM718 or JOUR632.
Formerly: JOUR632.

COMM719 Advanced Consecutive Interpretation (1-3 Credits)
Builds consecutive interpreting skills to a highly professional level by sharpening listening, processing, memory, note-taking, and delivery skills, enabling interpretation of highly complex material requiring particular attention to nuance, tone, and style. Includes dialogue and monologue interpreting exercises with specialized subject material. Participants emerge from the course as reflective practitioners with the simultaneous interpreting skills required to perform competently in real-world settings.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits if content differs.

COMM724 Seminar in Organizational Communication (3 Credits)
Theories and problems of human communication within, between, and/or among formal organizations will be emphasized.
Restriction: Permission of instructor.
Formerly: SPCH724.

COMM729 Simultaneous Interpretation (1-3 Credits)
Builds upon the discussion of the simultaneous mode and exercises in Introduction to Simultaneous Interpreting by reviewing the relationship between consecutive and simultaneous skills and introducing work in the booth in a series of progressive exercises. Addresses challenges such as coordination of split attention, ear-voice span, memory and delivery / presentation. Reinforces principles of collegial teamwork and good microphone technique in the booth. Enhances preparation skills required for interpretation of specialized subject matter.
Prerequisite: Admissions test for second year courses; and permission of ARHU-Communication department.
Repeatable to: 8 credits if content differs.

COMM730 Seminar in Health Communication (3 Credits)
Communication processes in health care and promotion.
Formerly: SPCH730.

COMM738 Seminar in Mediated Communication (3-12 Credits)
The examination of special topics related to the study of mediated communication.
Restriction: Permission of instructor.
Repeatable to: 12 credits if content differs.

COMM739 topics in Public Relations (3 Credits)
Seminar on specialized areas of scholarly research in public relations or on the practice of public relations in specialized organizational settings.
Repeatable to: 6 credits if content differs.
Formerly: JOUR739.

COMM748 The Rhetoric of the Presidency (3 Credits)
The study of the historical and contemporary rhetoric of the presidency in appropriate historical and political contexts. Scholarship related to public address studies and theories of the presidency will be featured.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: COMM748 or COMM768.
Formerly: COMM768.

COMM749 Advanced Simultaneous Interpretation (1-3 Credits)
Builds simultaneous interpreting skills to a highly professional level, including highly complex material requiring particular attention to nuance, tone, and style. Resolves any remaining challenges of split attention, ear-voice span, memory and delivery / presentation. Introduces simultaneous interpretation with text, based upon sight translation techniques. Participants emerge from the course as reflective practitioners with the simultaneous interpreting skills required to perform competently in real-world settings.
Prerequisite: COMM729; and admissions test for second-year courses; and permission of ARHU-Communication department.
Repeatable to: 4 credits if content differs.

COMM758 Seminar in Rhetorical Theory (3 Credits)
Examination of selected theories of style drawn from the fields of rhetoric and literature, and analysis of model speeches.
Prerequisite: COMM460, COMM461, or COMM450.
Repeatable to: 12 credits if content differs.
Formerly: SPCH758.

COMM759 Professional Practice Forum in Interpreting: Practicum (1-3 Credits)
Provides opportunities to interpret consecutively and simultaneously in real-world settings on campus and in the public service, legal, business, and political communities. Develops team leader skills by organizing and convening an event or series of events (conference, debate, or negotiation), selecting topics and delegates, and preparing speeches and arguments to deliver and interpret. Collaboration with participants in M.A. translation courses is sought. Requires independent study plan agreed with course instructor.
Prerequisite: Admissions test for second-year courses; and permission of ARHU-Communication department.
Repeatable to: 9 credits if content differs.

COMM760 Seminar in Political Communication (3 Credits)
A blend of theory and practice to integrate rhetorical-critical theory and empirical methods with politics. Practitioners in political communication will be drawn in as resource persons. Students will map the communication strategy for candidates and analyze actual campaign strategies.
Formerly: SPCH760.

COMM762 The Rhetoric of Political Institutions (3 Credits)
The role of discourse in major political institutions is examined. The specific institutional focus may change from instructor to instructor. Examples include Congress, the courts, or the state legislatures.

COMM768 Seminar in Public Address (3 Credits)
An in-depth study of national and international speakers and issues throughout the history of the spoken word. Emphasis will be placed upon the application of rhetorical principles to the analysis of world speakers and their speeches.
Repeatable to: 12 credits if content differs.
Formerly: SPCH768.

COMM769 Professional Practice Forum in Interpreting: Workplace Processes and Procedures (1-2 Credits)
Provides in-depth exploration of processes and procedures in public service, legal, and political settings where interpreting services are commonplace. Enables students to make informed career plans and choices. Empowers participants by helping to establish and reinforce identity as a professional interpreter, develop specializations, and pursue professional and career development opportunities through interaction with members of the profession, professional organizations, and institutions in the language industry.
Prerequisite: Admissions test for second-year courses; and permission of ARHU-Communication department.
Repeatable to: 3 credits if content differs.

COMM775 Seminar in Persuasion and Attitude Change (3 Credits)
This seminar will concentrate on the problem of making message strategy decisions. Course content will consist of study of both theoretical and empirical research on attitude and attitude change in persuasive communication.
Prerequisite: Permission of ARHU-Communication department.
Formerly: SPCH775.

COMM776 Seminar in Interpersonal Communication (3 Credits)
Interpersonal communication theory, research, and practice.
Formerly: SPCH776.

COMM777 Persuasive Message Strategies (3 Credits)
Examines which persuasive messages are effective to change attitudes and behavior at what times and with what people.
Credit Only Granted for: COMM698P or COMM777.
Formerly: COMM698P.

COMM778 Special Topics in Health and Risk Communication (3 Credits)
This graduate seminar introduces students to special topics in health and risk communication such as media and public health, health message design, risk perception and communication, health and environmental communication, health literacy, etc. It blends theoretical concepts with practical concerns and covers a specific topic with breadth and depth appropriate for a high-level graduate seminar.
Restriction: Permission of instructor.
Repeatable to: 9 credits if content differs.

COMM779 Seminar: Special Topics in Persuasion and Attitude Change (3 Credits)
This seminar explores special topic areas with the study of persuasion and attitude change, such as social cognition, humor, message production,and cognitive oscillation.
Recommended: COMM775.
Repeatable to: 9 credits if content differs.

COMM789 Seminar: Special Topics in Intercultural Communication (3 Credits)
Explores special topic areas within the study of intercultural communication, such as culture and conflict, intercultural negotiation, cross-cultural relationships.
Recommended: COMM683.
Repeatable to: 9 credits if content differs.

COMM798 Independent Study (1-3 Credits)
An individual course designed for intensive study or research of problems in communication.
Restriction: Permission of instructor.
Formerly: SPCH798.

COMM799 Master's Thesis Research (1-6 Credits)
Formerly: SPCH799.

COMM879 Special Research Problems in Persuasion and Attitude Change (1-4 Credits)
Directed team and individual research projects.
Prerequisite: Permission of ARHU-Communication department.
Repeatable to: 9 credits if content differs.

COMM888 Doctoral Practicum in Communication (3-9 Credits)
Analysis of professional activity through personal observation. Evaluation of the purpose, process, effectiveness, and efficiency of professional activity. Recommendations for training and further research.
Repeatable to: 9 credits if content differs.
Formerly: SPCH888.

COMM889 Doctoral Tutorial in Communication (3-9 Credits)
Individual research in communication.
Repeatable to: 9 credits if content differs.
Formerly: SPCH889.

COMM898 Pre-Candidacy Research (1-8 Credits)

COMM899 Doctoral Dissertation Research (1-8 Credits)
Formerly: SPCH899.

CONS - Sustainable Development & Conservation Biology

CONS608 Seminar in Sustainable Development and Conservation Biology (1-4 Credits)
Special topics and current literature in conservation biology and sustainable development.
Repeatable to: 6 credits if content differs.

CONS609 Special Topics in Conservation Biology (1-3 Credits)
Lectures, experimental courses and other special instructions in various subjects in conservation biology.
Repeatable to: 6 credits if content differs.

CONS670 Conservation Biology (3 Credits)
Conservation in the Anthropocene means conserving biodiversity and ecosystem function in the midst of climate change, habitat loss, overexploitation, altered nutrient cycling, and invasive species with protected areas and reserve networks, ecosystem restoration, and other biodiversity conservation and management schemes.Cross-listed with MEES670.
Credit Only Granted for: CONS670 or MEES670.

CONS680 Problem Solving in Conservation/Development (4 Credits)
Students will be exposed to current problems in conservation and development through great lectures, field trips, interviews and appropriate literature. Working in teams, students will formulate recommendations based on a synthesis of biological, economic and policy considerations.

CONS798 Research Papers in Sustainable Development and Conservation Biology (1-4 Credits)
Work on the required scholarly paper.
Restriction: Must be in Sustainable Development & Conservation Biology (Master's) program.
Repeatable to: 4 credits if content differs.

DANC - Dance

DANC405 Dance Education II: Education & Policy (3 Credits)
Curricula in dance in K-12 settings, classroom management, assessment/grading, and best practices in dance education in public schools. Current research and policy issues are included. This course counts towards teacher certification in the State of Maryland.
Restriction: Permission of ARHU-Dance department.

DANC409 Contact Improvisation (2 Credits)
Discovery and cultivation of the principles and skills of Contact Improvisation dance technique.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 4 credits.
Credit Only Granted for: DANC489C or DANC409.

DANC410 Technical Theater Production for Dance (3 Credits)
A study of the theoretical principles of production and the practical application of those principles to the presentation of dance works.
Prerequisite: DANC210; or students who have taken courses with comparable content may contact the department; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC420 Partnering (2 Credits)
Elements of contemporary partnering including weight sharing, counter balancing, momentum/leverage, lifting and moving responsively.
Restriction: Permission of ARHU-Dance department.

DANC429 Advanced Ballet Technique II (1 Credit)
Intensive work in ballet technique for the professionally-oriented dancer.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 3 credits.

DANC448 Modern Dance V (3 Credits)
Complex phrases of modern dance movement with emphasis on articulation and expression.
Prerequisite: DANC349; and must audition.
Repeatable to: 6 credits.

DANC449 Modern Dance VI (3 Credits)
Continuation of DANC448.
Prerequisite: DANC448; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC466 Laban Movement Analysis (3 Credits)
Introduction to Rudolf Laban's system of qualitative movement analysis in relation to understanding personal movement style. Application to dance performance, teaching, composition and research.

DANC468 Dance Repertory (3 Credits)
Form, content, music, design and performance of modern dance works.
Prerequisite: DANC349; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits if content differs.

DANC469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

DANC479 Advanced Practicum in Dance (1-3 Credits)
Advanced level performing experience for the student dancer who has developed an advanced professional level of competence.
Repeatable to: 6 credits.

DANC485 Seminar in Dance (3 Credits)
Individual research leading to a presentation with written documentation of the process, serving as a culmination of undergraduate study for dance majors.
Prerequisite: DANC483.
Restriction: Must be in Dance program; and senior standing.

DANC488 Project-Based Learning (3 Credits)
A specific project, is addressed, in dance from the perspectives of the investigator, the creator/choreographer, and the performer. Projects are cross-disciplinary and/or cross-cultural, and may involve both on- and off-campus experiences.
Restriction: Permission of ARHU-Dance department.
Repeatable to: 6 credits if content differs.

DANC489 Special Topics in Dance (1-3 Credits)
Theoretical, choreographic, pedagogic, or performance study.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits if content differs.

DANC499 Practicum in Choreography, Production and Performance IV (1-6 Credits)
Advanced workshop in dance presentation, including performing, production and planned field experiences.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC600 Graduate Dance Research (3 Credits)
Supervised writing of reports and articles on selected dance subjects. Study of library resources and interviewing techniques. Preparation for written documentation of thesis project.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC604 Graduate Studies in Dance Pedagogy (3 Credits)
Curriculum writing, lesson planning, class structure, assessment/grading, and practice in dance pedagogy. Includes preparation of syllabi and studio teaching practice. This course counts towards teaching ceritification in the State of Maryland.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC608 Graduate Choreography I: Creative Process (3-6 Credits)
Developing and defining individual choreographic voice and vision in a shared studio setting.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits if content differs.

DANC610 Workshop in the Direction of Dance Production (1 Credit)
A lecture/laboratory course dealing with the relationship of the director to all of the activities involved in the presentation of a dance concert.
Prerequisite: DANC410; or students who have taken courses with comparable content may contact the department.

DANC611 Dance Technology and Media (1 Credit)
Project-based development of media and technological support for dance performance, archiving, and portfolio design, development and implementation.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC647 Dance and Movement Practice (2 Credits)
Experiential studio work that generates common movement vocabulary and innovations of same in a shared, faculty-led exploration of movement for the purpose of generating vocabulary for technique, choreography, and pedagogy.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC648 Advanced Modern Dance Technique I (1 Credit)
Professional level training in contemporary dance techniques.
Prerequisite: DANC449; or admitted to the MFA in Dance program, or students who have taken courses with comparable content may contact the department.
Repeatable to: 6 credits.

DANC649 Advanced Modern Dance Technique II (1 Credit)
A continuation of DANC 648.
Prerequisite: DANC648; or students who have taken courses with comparable content may contact the department.
Repeatable to: 6 credits.

DANC678 Individual Movement Practice (2 Credits)
Students in consultation with the adviser, propose a specific movement practice and can select the practice from the range of technique offerings in the program. Additional work in documenting and providing evidence of growth towards individual outcomes is required.
Prerequisite: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 10 credits.

DANC679 Graduate Dance Performance (1-3 Credits)
An advanced performance course focusing on the restagings from noted scores of the choreographic works of significant artists in the field.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC689 Special Topics in Dance (1-6 Credits)
Special Topics in dance theory, research or creative projects.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 12 credits if content differs.

DANC698 Independent Study in Dance (1-3 Credits)
Directed independent study in theoretical topics.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC699 Thesis Writing Lab (1 Credit)
The final writing project in MFA dance degree demonstrates students' ability to write critically about their creative work in relation to the dance field at large. A successful written thesis demonstrates a familiarity with concepts from dance history and critical theory as well as an ability to analyze movement and choreography. During the thesis writing lab, each student organizes ideas and establishes individual goals for the written project.
Repeatable to: 3 credits.
Formerly: DANC689W.

DANC705 Arts Education (3 Credits)
History of arts education in the U.S., recent policy changes and trends, current and recent research findings, proposed legislation at the state and federal level and the relationship of research designed to, in part, prepare students to be K-12 arts education and/or researchers and/or policy professionals.

DANC708 Graduate Choreography II: Collaboration (3-6 Credits)
Collaborative work across disciplines and genres.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC719 Graduate Choreography III: Projects (3 Credits)
Research-based choreographic projects in preparation for the choreographed thesis project.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC766 Graduate Movement Observation and Analysis (3 Credits)
Aspects of cultural and nonverbal analysis, developmental movement, kinesiological analysis, Laban Movement Analysis, with the goal of developing the student/teacher's ability to observe macro and micro levels of detail.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC777 Internship in Dance (1-5 Credits)
Internship in dance advocacy, administration, education, community building, choreography, or performance with an agency off campus and with a national or international profile.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC779 Master's Tutorial for Performance (1-3 Credits)
Supervised performance experience for advanced dancers.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC784 Dance in a Global Context (3 Credits)
Topics that illuminate dance in global context and provides an overview of methods, challenges and perspectives to the study of dance cross-culturally will be considered. Simultaneously, surveys select dance practices spanning many geographical areas, and offers insight into the diverse social, cultural, religious, and political environments from which dance extends.
Restriction: Must be admitted to MFA in Dance; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

DANC788 Master's Tutorial for Choreography (1-3 Credits)
Supervised production and presentation of a significant choreographic project.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

DANC789 Directed Study in Dance Theory (2-6 Credits)
Advanced directed study in dance history, theory or criticism culminating in a paper for presentation or publication.
Repeatable to: 6 credits if content differs.

DANC799 Master's Thesis Project (1-6 Credits)
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

ECON - Economics

ECON401 Current Issues in American Economic Policy (3 Credits)
Analysis of current economic problems and public policies. Topics could include poverty, income inequality, social insurance, education, environmental sustainability, immigration, and innovation. Other issues may be substituted depending on current events.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON424, ECON422).
Restriction: Must be in Economics Bachelor of Arts program.

ECON402 Macroeconomic Models and Forecasting (3 Credits)
Analysis of the fluctuations in economic activity and the formulation and use of forecasting models of the economy. Illustrations of computer macro models and forecasting problems.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.

ECON406 Advanced Microeconomics (3 Credits)
Expands on the assumptions of rational decision-making used in intermediate microeconomics and develops more complicated, more realistic models which address uncertainty, intertemporal choices, strategic interactions, social preferences and considerations of what is fair.
Prerequisite: Minimum grade of C- in ECON326; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.

ECON407 Advanced Macroeconomics (3 Credits)
An in-depth analysis of current issues in macroeconomic theory and policy. Topics covered include: 1. alternative perspectives on macroeconomics including monetarism, new classical equilibrium models, rational expectations, and real business cycle models; 2. long term growth, the slowdown in productivity growth, and concerns about U.S. competitiveness; 3. the effectiveness of macroeconomic policy in an open economy; 4. the effects of finance on the real sector.
Prerequisite: Minimum grade of C- in ECON325; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.

ECON410 Comparative Economic Institutions (3 Credits)
Institutions are the sets of rules that constrain the decisions and interactions of economic agents. The course uses economic analysis to understand both formal institutions (e.g. laws) and informal institutions (e.g. cultural norms). Practical examples are drawn from economics, law, and politics, and reflect the experience of many different countries.
Prerequisite: Minimum grade of C- in ECON325 and ECON326; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.

ECON412 Economic History and Modern Development (3 Credits)
Analysis of major economic, political, and social change in the developed world since 1800. This includes factors contributing to increases in economic performance, changes in the form of government, technological change (including industrialization), and integration and disintegration of the global economy. Emphasis is on institutional changes in how societies organize economic and political activities.
Prerequisite: Minimum grade of C- in ECON325 and ECON326.
Restriction: Must be in Economics Bachelor of Science program.

ECON414 Game Theory (3 Credits)
Studies the competitive and cooperative behavior that results when several parties find that their individual outcomes are jointly determined. Students will learn how to use game theory to analyze situations of potential conflict. Applications are drawn from economics, business, and political science.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321, STAT400).
Restriction: Must be in one of the following programs (Economics Bachelor of Arts; Economics Bachelor of Science).
Credit Only Granted for: CMSC474, ECON414, GVPT399A or GVPT390.

ECON415 Market Design (3 Credits)
Focuses on recent developments in the design of markets to improve economic performance and to open new economic opportunities. It is divided into three main segments -- auction design, the design of matching mechanisms, and antitrust theory and policy.
Prerequisite: Minimum grade of C- in ECON414.
Restriction: Must be in Economics Bachelor of Science program.

ECON416 Analysis of Economic Development (3 Credits)
Analysis of the determinants and influences on economic development. Emphasis on both theoretical models and econometric methods of explaining why some countries are poor, along with examination of policies to promote development.
Prerequisite: Minimum grade of C- in ECON325, ECON326, and ECON422.
Restriction: Must be in Economics Bachelor of Science program.
Credit Only Granted for: ECON315 or ECON416.

ECON417 Estimating Policy and Program Impact (3 Credits)
Governments, businesses, non-profits, funders, and other organizations must allocate scarce resources between competing uses. Understanding the causal effect of policies, programs or investments on key outcomes can guide the choices of these decision-makers. Correlations between policies and outcomes or changes in outcomes after new policies are adopted are rarely sufficient for estimating the causal effect, however. This course focuses on econometric strategies for obtaining unbiased causal estimates, including experimental methods, instrumental variables, regression discontinuity, and differences-in-differences. There will be an emphasis on using Stata and on interpreting the results of econometric analysis
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326) and 1 course with a minimum grade of C- from (ECON424, ECON422).
Restriction: Must be in Economics Bachelor of Arts program.

ECON418 Economic Development of Selected Areas (3 Credits)
Economic and institutional characteristics of a specific geographic area are identified and discussed, and alternate strategies and policies for development are analyzed.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON306, ECON325, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.
Repeatable to: 6 credits if content differs.

ECON422 Econometrics I (3 Credits)
Emphasizes the interaction between economic problems and the assumptions employed in statistical theory. Formulation, estimation, and testing of economic models, including single variable and multiple variable regression techniques, theory of identification, and issues relating to inference.
Prerequisite: 1 course with a minimum grade of C- from (ECON325, ECON326); and 1 course with a minimum grade of C- from (STAT400, ECON321).
Restriction: Must be in Economics Bachelor of Science program.
Credit Only Granted for: ECON422, ECON424, or AREC422.

ECON423 Econometrics II (3 Credits)
Interaction between economic problems and specification and estimation of econometric models. Topics include issues of autocorrelation, heteroscedasticity, functional form, simultaneous equation models, qualitative choice models, and other computational methods.
Prerequisite: Minimum grade of C- in ECON422.
Restriction: Must be in Economics Bachelor of Science program.

ECON424 Applied Econometrics (3 Credits)
Provide the knowledge and skills necessary to accomplish and utilize basic applied econometric analysis utilized by many business service providers, government agencies, and nonprofits engaged in policy analysis. Topics include simple and multiple regressions using cross section, time series, and panel data, issues of heteroskedasticity, serial correlation, and multicollinearity, models with binary dependent variable, and program evaluation. Course emphasizes application of knowledge using software packages but still covers essential theoretical background.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON306, ECON325, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.
Credit Only Granted for: ECON422, ECON424 or AREC422.

ECON425 Mathematical Economics (3 Credits)
Covers mathematical tools and skills utilized in upper undergraduate and master's level coursework in Economics and Public Policy. Reviews calculus and math of finance and growth. Introduces techniques of optimization, linear algebra, and differential equations and connects them to micro and macro theory and applications. Topics will also include coverage of probability theory to explore how economists model uncertainty, as well as economic applications of integration.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326).
Restriction: Must be in Economics Bachelor of Arts program.

ECON426 Economics of Cost-Benefit Analysis (3 Credits)
Study of how to use cost benefit analysis and other similar tools of applied microeconomics to conduct policy analyses. Cost-benefit analysis is an empirical method of identifying an optimal choice from a set of policy alternatives, where optimal is defined in terms of economic efficiency. Real world examples are addressed, so that students understand limitations of the methods and also interactions of economic analysis with political and administrative processes.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON306, ECON325, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.

ECON427 Experimental Economics (3 Credits)
An introduction to the methodology of experimental economics and its application to issues such as decision-making under uncertainty, auctions, and public goods. Also an introduction to behavioral economics as a relatively new area of economic research.
Prerequisite: Minimum grade of C- in ECON326; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.

ECON434 The Economics of Information and Uncertainty (3 Credits)
How do rational agents make decisions when faced with uncertainty? How do markets and other institutions deal with risks? How do markets behave when some actors are better informed than others? What incentives influence whether economic decision-makers hide or reveal information? Topics include the value of information, the purchase of warranties, agency problems in management, adverse selection and moral hazard in insurance, and signaling in education.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321, STAT400).
Restriction: Must be in one of the following programs (Economics Bachelor of Arts; Economics Bachelor of Science).
Credit Only Granted for: ECON498U or ECON434.
Formerly: ECON498U.

ECON435 Financial Markets and the Macroeconomy (3 Credits)
The different types of financial assets that exist, the markets that they trade in, and the determination of their prices and rates of return are examined. Specific topics that will be covered include the Markowitz portfolio selection model, the capital asset pricing model, the arbitrage pricing theory, the efficient markets hypothesis, the term structure of interest rates, and options. There will be almost no emphasis on issues in corporate finance.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program; and must not have completed BMGT343.
Credit Only Granted for: BMGT343 or ECON435.
Additional Information: Finance majors will not receive credit for ECON435.

ECON436 Financial Econometrics (3 Credits)
An introduction to financial econometrics, which is data science applied to understanding the financial system. Students will learn modern techniques in financial econometrics with an emphasis on the interaction between modeling (theory) and empirical analysis. Topics include relevant economic theory, optimization techniques, probability models, statistical analysis, and use of statistical software.
Prerequisite: Minimum grade of C- in ECON325 and ECON422.
Restriction: Must be in Economics Bachelor of Science program.

ECON441 Theory of International Economics (3 Credits)
Theoretical treatment of international trade and international finance. Includes Ricardian and Heckscher-Ohlin theories of comparative advantage, analysis of tariffs and other trade barriers, international factor mobility, balance of payments adjustments, exchange rate determination, and fiscal and monetary policy in an open economy.
Prerequisite: Minimum grade of C- in ECON326 and ECON325.
Restriction: Must be in a major within the BSOS-Economics department; and must not have completed ECON340, ECON442, or ECON443.
Credit Only Granted for: ECON340, ECON441, ECON442, or ECON443.

ECON442 Globalization and Capital Markets (3 Credits)
Uses models of open-economy macroeconomics to explain the causes and consequences of international capital flows. Analysis is made of private consumption, investment, the government sector, current accounts, the labor market, and the money and foreign exchange markets in small open economies. This framework is then used to study examples of how speculative attacks on currencies, sudden reversals of capital inflows, and the effects of the lack of credibility of economic policy affect economic development.
Prerequisite: Minimum grade of C- in ECON326 and ECON325; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program; and must not have completed ECON441.
Credit Only Granted for: ECON441 or ECON442.

ECON443 International Trade and Trade Policy in the New Global Economy (3 Credits)
Examines the economics of international economic integration, including the theory of customs unions and free trade areas, the role of GATT and the WTO, changes in individual countries' foreign trade policies during the new era of globalization, the special role of multinational firms in world trade, and recent controversies about the benefits and costs of globalized trade.
Prerequisite: 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program; and must not have completed ECON441.
Credit Only Granted for: ECON441 or ECON443.

ECON444 Research in Globalization (3 Credits)
As globalization continues, individual countries must confront a variety of related issues including rising inequality, decline of domestic industries, climate change, and disputes over intellectual property rights. Various economic models and research methods will be covered to develop the analytic and empirical skills needed to perform independent research in globalization. Students will prepare literature reviews, conduct preliminary empirical investigations using STATA, and produce well-designed research proposals.
Prerequisite: Minimum grade of C- in ECON326 and ECON422.
Restriction: Must be in Economics Bachelor of Science program.
Credit Only Granted for: ECON498G or ECON444.
Formerly: ECON498G.

ECON451 Public Choice (3 Credits)
Analysis of collective decision making, economic models of government, program budgeting, and policy implementation; emphasis on models of public choice and institutions which affect decision making.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.

ECON453 Natural Resources and Public Policy (3 Credits)
Rational use and reuse of natural resources. Theory, methodology, and policies concerned with the allocation of natural resources among alternative uses. Optimum state of conservation, market failure, safe minimum standard, and cost-benefit analysis.
Prerequisite: AREC326, ECON306, or ECON326; and (BMGT230 or ECON230).
Restriction: Must be in one of the following programs (Agricultural and Resource Economics; Agricultural and Resource Economics: Agribusiness; Agricultural and Resource Economics: Environmental and Resource Economics; Economics Bachelor of Arts; Environmental Science & Policy-Env Economics). Cross-listed with AREC453.
Credit Only Granted for: AREC453 or ECON453.

ECON454 Public Finance and Public Policy (3 Credits)
The role of the the public sector in a market economy constitutes the over-arching topic of this course. Emphasis lies on analyzing government expenditure programs and the microeconomics of tax policy.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321, STAT401).
Restriction: Must be in one of the following programs (Economics Bachelor of Arts; Economics Bachelor of Science).

ECON455 Economics of Education Policy (3 Credits)
Examines the role that government plays in providing and financing education. Analyzes why people invest in education. Considers the effects of education on long-term social and economic outcomes, the behavior of institutions that produce education, and how to design and implement public policies affecting the level and distribution of educational resources. Uses microeconomic models and empirical findings to analyze current issues in education policy.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.
Credit Only Granted for: ECON468E or ECON455.
Formerly: ECON468E.

ECON456 Law and Economics (3 Credits)
Relationship of the exchange process to the system of institutions and rules that society develops to carry out economic transactions. Topics covered include: Property rights; torts, negligence, and liability; contracts and exchanges; criminal control and enforcement; equity and efficiency issues .
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.

ECON458 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Prerequisite: At least one intermediate theory course and/or statistics.
Repeatable to: 15 credits if content differs.

ECON460 Industrial Organization (3 Credits)
Examines different theoretical models of firm behavior in markets with varying amounts of market power. Relates theory to specific industries and examines how market structure evolves over time.
Prerequisite: Minimum grade of C- in ECON326; and 1 course with a minimum grade of C- from (ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Science program.

ECON461 Economics of Regulation and Anti-trust (3 Credits)
Considers government intervention in economic activity of three types: antitrust policy, regulation of natural monopolies, and health safety regulation. Covers theoretical models, real-world policy applications, and empirical studies relevant to the impact of regulation.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321).
Restriction: Must be in Economics Bachelor of Arts program.

ECON462 Economics of Entrepreneurship (3 Credits)
Economic theory highlights the role of entrepreneurs in fueling economic growth and accomplishing reallocation of resources in response to changes in preferences, technology, demographics, and resource. This course uses empirical evidence to examine the extent to which these predictions are valid. To more fully understand the motivations and constraints relevant to entrepreneurs, student will write a business plan as if s/he were starting a new business.
Prerequisite: Minimum grade of C- in ECON422.
Restriction: Must be in Economics Bachelor of Science program.
Credit Only Granted for: ECON398O or ECON462.
Formerly: ECON398O.

ECON463 Economics of Sports (3 Credits)
The application of theoretical and empirical economic tools to the sports industry, including competition at professional,collegiate, and international levels. Microeconomic models from labor, industrial organization and public finance will be applied to the sports industry and combined with data from sports markets, providing students with opportunities to produce and interpret economic analysis. The topic of discrimination will also be explored in the context of this particular economic activity.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321, STAT400).
Restriction: Must be in Economics Bachelor of Arts program.

ECON465 Health Economics (3 Credits)
Analyze markets for health care and related products by understanding the incentives and constraints for various participants, including individuals, family units, doctors, pharmaceutical companies, hospitals, and insurance providers. Analysis will combine both theoretical models and empirical tools.
Prerequisite: Minimum grade of C- in ECON406 and ECON422; or students who have completed ECON321 or STAT400 with an A- or better and are concurrently enrolled in ECON422, may seek permission to enroll in ECON465 from an ECON advisor. No exceptions will be made for the ECON406 prerequisite.
Restriction: Must be in Economics Bachelor of Science program.

ECON468 Special Topics in Applied Economics (3 Credits)
Selected topics in applied economics. Designed to meet the changing interests of students and staff.
Prerequisite: 1 course with a minimum grade of C- from (BMGT230, ECON230); and 1 course with a minimum grade of C- from (ECON305, ECON306).
Restriction: Must be in Economics Bachelor of Arts program.
Repeatable to: 15 credits if content differs.

ECON470 Labor Economics: Theory and Evidence (3 Credits)
Analysis of labor markets in theory and the real world. Topics include labor supply, labor demand, human capital, performance incentives, unemployment, discrimination, and immigration. Students will develop an understanding of how formal economic research is used to analyze U.S. labor markets and how research influences policy debates.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, BMGT230, ECON321, STAT401).
Restriction: Must be in one of the following programs (Economics Bachelor of Arts; Economics Bachelor of Science).
Credit Only Granted for: ECON470 or ECON471.

ECON471 Labor Market Policies and Research (3 Credits)
Economic analysis of labor based on modern theory and empirical analysis. Focus on public policy, studying the interactions between labor demand and labor supply in the labor market and how policies impact those interactions. Possible policies include welfare policy, minimum wage policy, immigration policy, and anti-discrimination policies. Uses statistical software to summarize and create visualizations of economic data.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON424, ECON422).
Restriction: Must be in one of the following programs (Economics Bachelor of Arts; Economics Bachelor of Science).
Credit Only Granted for: ECON470 or ECON471.

ECON472 Economics of Social Safety Nets (3 Credits)
Analysis of the economic issues associated with social safety nets. Topics to be covered include the cash transfer programs for breaking the cycle of poverty, labor market policies aimed at combating unemployment, childhood interventions to improve human capital development, and the challenges faced by pension systems over the world. The approach is based on a life-cycle perspective. Evidence and experiences from developed and developing countries will covered.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and minimum grade of C- in ECON424.
Restriction: Must be in Economics Bachelor of Arts program.

ECON481 Environmental Economics (3 Credits)
An exploration of the use of economic incentives for protection of the environment and the determination of appropriate (or efficient) level of environmental quality. Also covers the choice of policy instruments for the attainment of environmental standards.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230).
Restriction: Must be in one of the following programs (Agricultural and Resource Economics; Agricultural and Resource Economics: Agribusiness; Environmental Science & Policy-Env Economics; Agricultural and Resource Economics: Environmental and Resource Economics; Economics Bachelor of Arts program). Cross-listed with: AREC481.
Credit Only Granted for: ECON481 or AREC481.

ECON484 The Economics of Climate Change (3 Credits)
The role of economics in the formation of climate policy; basic concepts of environmental economics including efficiency, externalities, and policy instruments; economic models of intertemporal decisions and decision making in the face of uncertainty. Applied economic analysis of specific issues and current policy initiatives.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230). Cross-listed with: AREC454.
Credit Only Granted for: AREC454 or ECON484.

ECON485 Economics of Land Use (3 Credits)
Fundamentals of location theory. Microeconomics of land use decisions, including determination of rent and hedonic pricing models. Impacts of government decisions on land use, including regulation (e.g., zoning), incentives (transferable development rights), provision of public services, and infrastructure investments. Impacts of land use on environmental quality, including issues relating to sprawl, agricultural land preservation, and other topics of special interest.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230). Cross-listed with: AREC455.
Credit Only Granted for: AREC455 or ECON485.

ECON486 Energy and Environmental Economics (3 Credits)
Economic theory and empirical methods are used to study problems of energy, the environment, and the economy. It examines the extraction, production, and use of energy and market institutions and regulatory approaches used to correct market failures. Topics covered include: oil and natural gas markets, management and design of electricity markets, renewable energy, non-market valuation , climate change, and transportation policies.
Prerequisite: 1 course with a minimum grade of C- from (AREC326, ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230). Cross-listed with: AREC456.
Credit Only Granted for: AREC456 or ECON486.

ECON488 Applied Research Practicum (1-3 Credits)
Students gain experience applying economic knowledge and producing research valued by businesses, non-profits, and/or government agencies. Students engage in activities similar to what an intern or entry-level employee would perform. Students work in small groups to find different kinds of data and facts, analyze and interpret this information, and use research findings to develop and present recommendations for simulated clients.
Prerequisite: 1 course with a minimum grade of B- from (BMGT230, ECON321, ECON230); and 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326).
Recommended: ECON422, ECON402, or ECON424.
Restriction: Permission of BSOS-Economics department.
Repeatable to: 6 credits if content differs.

ECON489 Applied Economics Practicum (1-3 Credits)
Students gain experience explaining economic knowledge to people who have not studied economics. Students engage in activities preparing them for careers in banking, business consulting, financial education, wealth management, and related services.
Restriction: Permission of BSOS-Economics department.
Repeatable to: 6 credits if content differs.

ECON490 Urban & Regional Economics: Issues and Policies (3 Credits)
Exploration of urban and regional economics and policies, including economic forces leading to formation of city and regional networks. Conceptual and empirical analysis of policies affecting land use, housing, transportation and other aspects of sub-national economic development.
Prerequisite: 1 course with a minimum grade of C- from (ECON306, ECON326); and 1 course with a minimum grade of C- from (ECON321, BMGT230, ECON230).
Restriction: Must be in Economics Bachelor of Arts program.
Credit Only Granted for: ECON398I or ECON490.
Formerly: ECON398I.

ECON498 Special Topics in Economic Analysis (3 Credits)
Selected topics in economic analysis. Designed to meet the changing interests of students and staff.
Prerequisite: 1 course with a minimum grade of C- from (ECON321, STAT400); and 1 course with a minimum grade of C- from (ECON325, ECON326).
Restriction: Must be in Economics Bachelor of Science program.
Repeatable to: 15 credits if content differs.

ECON499 Independent Research in Economics (1-3 Credits)
Directed research under the supervision of a faculty member. Contact department for additional information.
Prerequisite: 1 course with a minimum grade of C- from (ECON230, ECON321, BMGT230, STAT400); and 1 course with a minimum grade of C- from (ECON305, ECON325); and 1 course with a minimum grade of C- from (ECON306, ECON326); and minimum of 3 credits from ECON400-499 course range.
Restriction: Permission of BSOS-Economics department.
Repeatable to: 6 credits if content differs.

ECON601 Macroeconomic Analysis I (3 Credits)
Introductory technical treatment of standard Keynesian, classical and new classical macroeconomic models. Expectations formation and microeconomic foundations of consumption, investment, money demand, and labor market behavior.
Restriction: Permission of BSOS-Economics department.

ECON602 Macroeconomic Analysis II (3 Credits)
Further issues regarding macroeconomic topics. First half emphasis will be placed on dynamic macroeconomic theory as pertaining to monetary issues, policy ineffectiveness and effectiveness. The second half of the course will focus on theories of investment and growth.
Prerequisite: ECON601; or permission of BSOS-Economics department.

ECON603 Microeconomic Analysis I (3 Credits)
A detailed treatment of the theory of the consumer and of the firm, particularly emphasizing the duality approach. Topics include the household production model, imperfect competition, monopolistic and oligopolistic markets.
Restriction: Permission of BSOS-Economics department.

ECON604 Microeconomic Analysis II (3 Credits)
Analysis of markets and market equilibria; the Arrow-Debreu model of general equilibrium, the two-sector model, welfare theorems, externalities, public goods, markets with incomplete and asymmetric information.
Prerequisite: ECON603.
Restriction: Permission of BSOS-Economics department.

ECON611 Seminar in American Economic Development (3 Credits)
Selected topics in the long-term movements of the American economy. Quantitative studies of the growth of output; applications of econometric methods and economic theory to topics in American economic history.
Restriction: Permission of BSOS-Economics department.

ECON613 Origins and Development of Capitalism (3 Credits)
Institutions and technology shaping pre-capitalist economies: Archaic, Greek and Roman, Feudal, and Mercantile. Rise of the market system, national economies, and capitalism. The nature of industrial society. Imperialism.

ECON615 Development Economics I (3 Credits)
Explore both the causes and consequences in development economics from a historical and scientific approach. Presents theoretical models and applied work that test alternative hypotheses. Explore models of economic growth and institutions, with emphasis on property rights and political regimes as causal factors affecting development. Discuss empirical methods widely used in the field and important related topics including poverty, inequality, education and health.
Prerequisite: ECON603; or permission of BSOS-Economics department.

ECON616 Economic Development II (3 Credits)
Survey of a variety of models explaining how market failures may lead to poverty and underdevelopment, with an emphasis on the empirical evaluation of constraints faced by individuals in developing countries and the programs that attempt to alleviate those constraints. Topics include: agricultural and land markets, labor markets, human capital in developing countries, credit markets, and consumption smoothing and risk coping.
Prerequisite: ECON615, ECON603, and ECON604; or permission of BSOS-Economics department.

ECON623 Econometrics I (3 Credits)
Specification, estimation, hypothesis testing and prediction in the classical and generalized linear regression model. Topics include: ordinary least squares, generalized least squares, instrumental variableestimation, quantile regression, finite and large sample analysis and general testing principles including misspecification tests. The course will also provide instructions on the use of a major statistical packagesuch as Stata or TSP.
Prerequisite: Must have advanced knowledge of probability, statistics, and linear algebra.
Restriction: Permission of BSOS-Economics department.

ECON624 Econometrics II (3 Credits)
A continuation of ECON623. Topics include: Nonlinear models and nonlinear estimation methods (generalized method of moments and maximum likelihood estimation), panel data models, univariate dynamic models, multivariate dynamic models including simultaneous equation models, and non-parametric/semiparametric estimation methods. The course will also provide instructions on the use of a major statistical package such as Stata or TSP.
Prerequisite: ECON623; or permission of BSOS-Economics department.

ECON625 Computational Economics (3 Credits)
An examination of the specification, computation, estimation and interpretation of structural models that are widely used in Industrial Organization, and in a range of other applied microeconomic contexts (marketing and public, environmental, education and urban economics). The focus will be on the connections between these models and relevant economic theories, and on the details of their implementation in practice.
Prerequisite: ECON604 and ECON624.
Credit Only Granted for: ECON625 or ECON698R.
Formerly: ECON698R.

ECON626 Empirical Microeconomics (3 Credits)
To provide students with the opportunity to use empirical techniques that are particularly valuable in the analysis of microeconomic data. Topics include panel data, nonlinear optimization, limited dependent variables, truncated, censored, selected samples, the analysis of natural experiments, and quantile regressions. This course will emphasize hands-on practical experience.
Prerequisite: ECON624.
Restriction: Must be in Economics (Doctoral) program.

ECON630 Computational Methods in Macroeconomics (3 Credits)
Essential computational methods used in macroeconomics. There will be particular focus on approximating the solution to dynamic stochastic general equilibrium models. Methods for representative-agent and heterogeneous-agent models will be extensively studied. Econometric methods such as Generalized Method of Moments, Maximum Likelihood, Vector Autoregressions wil also be covered.
Prerequisite: ECON602 and ECON601.
Restriction: Must be in one of the following programs (Economics (Master's); Economics (Doctoral)) ; or permission of BSOS-Economics department.

ECON635 Experimental Economics (3 Credits)
An introduction to the methodology of laboratory and field experiments. The course concentrates on a series of experiments to show how experiments build on one another, allowing researchers with different theoretical dispositions to narrow the range of potential disagreement.
Restriction: Permission of instructor.

ECON636 Behavioral Economics (3 Credits)
An exploration of how people make decisions, questioning the concept of "perfect rationality" in the standard economic theory, providing improved models in line with the observed biases of decision makers. Focusing on decision making under risk and ambiguity, endowment effect, status quo bias, loss aversion, intertemporal choice, and selfish and pro-social preferences.
Prerequisite: ECON603 and ECON604; and permission of BSOS-Economics department.

ECON637 Decision Theory (3 Credits)
Decision making is a process in which we select a course of action among available options. This course will explore the various behavioral biases observed in decision making processes by adjusting our normative theories to capture these biases.
Prerequisite: ECON603 and ECON604.
Restriction: Must be in the Economics program; or must have completed ECON603 and ECON604 with a letter grade of B+ or better.
Credit Only Granted for: ECON698B or ECON637.
Formerly: ECON698B.

ECON641 Microeconomic Analysis (3 Credits)
Microeconomic analysis applied to public policy problems with an emphasis on practical examples and how they illustrate microeconomic theories. Policy issues such as pollution, welfare and income distribution, market design, industry regulation, price controls, tax policy and health insurance are practical examples used to illustrate the abstract principles of microeconomics.
Restriction: Must be in M.Prof.Studies: Applied Economics program; or permission of BSOS-Economics department.
Credit Only Granted for: ECON641 or ECON506.
Formerly: ECON506.

ECON642 Topics in Applied Macroeconomics (3 Credits)
Focus is on applied macroeconomic models used by federal agencies to explain and predict economic behavior. Course emphasizes macroeconomic data: NIPA accounts, GDP, construction and application of CPI, labor force data and economic indicators. Students will also study a selected set of current macroeconomic topics including models of economic growth, economic fluctuations, monetary policy, inflation and financial markets.
Restriction: Must be in M.Prof.Studies: Applied Economics program; or permission of BSOS-Economics department.

ECON643 Empirical Analysis I: Foundations of Empirical Research (3 Credits)
Fundamental aspects of data management and interpretation emphasizing sampling, descriptive statistics, index numbers and construction of aggregated variables. Students will learn probability theory, confidence intervals, hypothesis testing and regression analysis using the EXCEL spreadsheet program and STATA statistical software.
Credit Only Granted for: ECON643 or ECON521.
Formerly: ECON521.

ECON644 Empirical Analysis II: Introduction to Economic Models (3 Credits)
An introduction to econometric methods with applications to public policy analysis. Primary focus on application and interpretation of multiple regression analysis.
Prerequisite: ECON643.

ECON645 Empirical Analysis III: Econometric Modeling and Forecasting (3 Credits)
Study of empirical techniques that are particularly relevant to the analysis of microeconomic models. Emphasis is on advanced panel data methods, time series regressions, instrumental variables, limited dependent variables, and sample selection corrections.
Prerequisite: ECON644.
Credit Only Granted for: ECON645 or ECON523.
Formerly: ECON523.

ECON652 Public Economics I (3 Credits)
The characteristics and effects of government programs whose role is redistribution and social insurance are considered. Examples include cash welfare assistance, unemployment insurance, and Social Security. The focus is on U.S. programs, though other countries may be considered. Both theories of program design and empirical research on program effects will be covered. Topics in empirical methodology generally will also be stressed.
Prerequisite: ECON604 and ECON624.

ECON661 The Corporate Firm (3 Credits)
This course examines firms' strategic behavior in a variety of settings and considers theories of the firm and industrial structure. Topics may include product choice, quality, advertising, consumer search and switch costs, manufacturer-retailer relations, manufacturer-supplier relations, vertical integration, and alternative industrial structures.
Prerequisite: ECON604 and ECON603.

ECON662 Empirical Industrial Organization (3 Credits)
Dynamic models are important tools to understand intertemporal individual choices and industry evolution. The course discusses a number of issues estimating and solving dynamic models, complimenting and building on the methods and topics introduced in 625. The course also covers models of endogenous product choice, matching and market design. There will be two main sets of assignments, where students simulate data by solving models, estimate models based on simulated or real data and perform counterfactual analyses. The students will also be expected to submit a research proposal.
Prerequisite: ECON604 and ECON603.

ECON664 Empirical Studies in Industrial Organization (3 Credits)
Review recent empirical literature in industrial organization. Covers price discrimination, cartel and collusion, entry and market structure, information and competition, technological change and adoption, auction, and firm organization.
Prerequisite: ECON603, ECON604, and ECON624.
Credit Only Granted for: ECON664 or ECON698J.
Formerly: ECON698J.

ECON668 The Economics of Retail Systems (3 Credits)
This course is designed mainly but not exclusively for students in the third year of the economics Ph.D program and for students at a similar stage in a marketing program. Its main objective is to help the student generate their first professional research paper. In terms of interests it targets those in the area of microeconomics (advanced micro, industrial organization, or more generally applied microeconomics or micro aspects of any field). The course will be conducted as a seminar.
Repeatable to: 6 credits if content differs.

ECON670 Financial Economics (3 Credits)
The course applies microeconomic theory and applied econometric techniques to the study of financial institutions and markets for financial assets. Students will learn how economists model and estimate the value of financial assets. The economic and empirical models are of interest to public policy makers and private wealth managers. Specific topics can include financial intermediation, the regulation of financial institutions, risk management, portfolio theory, the capital asset pricing model and the efficient markets hypothesis.
Prerequisite: ECON641; and must have completed or be concurrently enrolled in ECON644.
Restriction: Must be in M.Prof.Studies: Applied Economics program.

ECON671 Economics of Health Care (3 Credits)
An examination of the structure, conduct and performance of the health care market, including a study of physician services, the pharmaceutical industry, the hospital market and health insurance. Extensive use of quantitative and analytic economic tools with special emphasis on regulatory response to market imperfections.
Prerequisite: ECON641; and must have completed or be concurrently enrolled in ECON645.
Credit Only Granted for: ECON671 or ECON565.
Formerly: ECON565.

ECON672 Program Analysis and Evaluation (3 Credits)
Students study the tools used to evaluate the effectiveness of public policies. All evaluations have weaknesses, and some have more weaknesses than others. You will learn how to distinguish high from low quality evaluations. We will discuss the basic economics and econometrics of program evaluation, focusing on the application of methods used for causal inference and cost-benefit analyses in public policy contexts. We will examine published evaluation research with the intent of showing how the research does or does not lead to clear conclusions regarding program performance.
Prerequisite: ECON641 and ECON645.

ECON673 Information, Game Theory and Market Design (3 Credits)
A study of the strategic decision-making and the theory and practice of market design. Focus is on the design of organized market and incentives created by market rules. Topics include online auction markets, government auctions procurement auctions and matching markets. The analysis includes documenting the rules of real-world markets, game theoretic analysis, empirical analysis, and experimental work.
Prerequisite: ECON641; and must have completed or be concurrently enrolled in ECON644.

ECON674 Economic Analysis of Law (3 Credits)
A study of the application of economics to law with a focus on game theory, strategic behavior and public policy.
Prerequisite: ECON641; and must have completed or be concurrently enrolled in ECON644.

ECON675 Environmental Economics (3 Credits)
A study of the nature of environmental regulation focusing on U.S. environmental policies and policy debates.
Prerequisite: ECON641; and must have completed or be concurrently enrolled in ECON645.

ECON676 Economic Development (3 Credits)
Analysis of economic development. The course will focus on the consequences of poverty and poor institutions for the behavior and welfare of individuals, households, firms and the aggregate economy in developing countries. Theoretical models and empirical evidence will be used to understand the intended and unintended consequences of policies designed to enhance economic development.
Prerequisite: ECON641; and ECON642; and must have completed or be concurrently enrolled in ECON644.
Restriction: Must be in M.Prof.Studies: Applied Economics program.

ECON677 International Trade and Applications (3 Credits)
A mix of theory and empirical work. Students will analyze the causes and consequences of international trade. The course will cover a set of conceptual tools that are useful for understanding "globalization" and the usage of these tools to address interesting and important questions about how countries, firms, and workers respond to international trade.
Prerequisite: ECON641 and ECON644.
Restriction: Must be in MS Applied Economics program; or with permission from the program director.

ECON681 Comparative Institutional Economics I (3 Credits)
Theory, empirics, and practice of economic institutions. Genesis, functions, and effects of institutions. Examinations of three major institutions, property, contract, and decentralization. Historical, cultural, political, and economic origins of institutions. Case studies from English history, comparative legal studies, China, history of world economic development, transition, and socialism. Perspectives from law and economics, contract theory, and information theory.

ECON683 International Macroeconomics and Finance (3 Credits)
Economic analysis of international macroeconomic issues and policy. Topics can include the study of exchange rates, balance of payments, international financial markets, international business cycles, contagion, and the roles played by international economic institutions.
Prerequisite: ECON641 and ECON642; and must have completed or be concurrently enrolled in ECON644.
Restriction: Must be in M.Prof.Studies: Applied Economics program.

ECON684 Applied Time Series Analysis and Forecasting (3 Credits)
This course builds on the brief introduction to time series econometrics offered in ECON 645. Students will learn the theory of stationary processes and how it applies to econometric techniques for estimation and forecasting based on time series data. The techniques will be applied in macroeconomic, financial and business applications.
Prerequisite: ECON642; and ECON645.
Restriction: Must be in M.Prof.Studies: Applied Economics program.

ECON687 Economics Applications of R Programming (3 Credits)
Builds on the data analysis and econometric skills learned in the Empirical analysis sequence of ECON 643, 644, and 645. The STATA skills acquired in that sequence, such as basic data manipulation and econometric estimation, will be extended to the R programming language. The fundamentals of more advanced scientific programming--objects, data structures, loops, functions, simulation, parallel computing--will be introduced with applications to economics and the social sciences. Additional emphasis is placed on good coding practices and tools for version control and collaboration such as Git and R Markdown.
Prerequisite: ECON645.
Restriction: Must be in Applied Economics Master of Science program; or permission of the program director.

ECON698 Selected Topics in Economics (3 Credits)

ECON701 Advanced Macroeconomics I (3 Credits)
Recent developments in macroeconomics with an emphasis on topics and techniques useful for conducting research in macroeconomics. Topics include advanced treatment of fiscal and monetary policy issues; the role of imperfect competition; real, sectoral and nominal business cycle models.
Prerequisite: ECON602 and ECON601.

ECON702 Advanced Macroeconomics II (3 Credits)
Selected issues in monetary economics with an equal emphasis of learning the models and understanding important issues: a survey of models (cash-in-advance, money-in-the-utility-function, transaction cost, search-based models), empirical issues in monetary economics, business cycles and money, monetary policy, welfare cost of inflation, alternative media of exchange.
Prerequisite: ECON602 and ECON601.

ECON703 Advanced Microeconomics I (3 Credits)
A formal treatment of game theory and its microeconomic applications is presented. Equilibrium concepts for static and dynamic games, and games with complete and incomplete information are studied. Topics also discussed: the relation between games in strategic form and games in extensive form, equilibrium refinement, Bayesian games, multi-dimensional mechanism design, dominant strategy and Bayesian implementation, Nash-in-Nash bargaining solutions.
Prerequisite: ECON604 and ECON603.

ECON704 Advanced Microeconomics II (3 Credits)
This is the second half of a two-semester sequence in Advanced Microeconomics, intended for second-year Ph.D. students. The course material varies from year-to-year, but currently it focuses on auction theory, matching theory, and the relationship between matching and auction theory. Other topics that are treated in some years include: sequential bargaining under incomplete information; and equilibrium refinements.
Prerequisite: ECON604 and ECON603.

ECON708 Advanced Topics in Applied and Theoretical Microeconomics (2 Credits)
Read, discuss, and analyze current topics in microeconomics, including public economics, environmental economics, labor economics, industrial economics, microeconomic theory, public choice and international trade. Specific topics covered will change from semester to semester depending on the students' and faculty's interests. Intended primarily for students beginning thesis research in economics.
Prerequisite: Must have completed a one-year graduate sequence in one of the microeconomic fields.
Repeatable to: 12 credits if content differs.

ECON709 Advanced Topics in Applied and Theoretical Macroeconomics (2 Credits)
Read, discuss, and analyze current topics in macroeconomics, including asset pricing models, models of economic growth, investment, and the labor market. Specific topics covered will change from semester to semester depending on the students' and faculty's interests. Intended primarily for students beginning thesis research in economics.
Prerequisite: Must have completed a one-year graduate sequence in one of the macroeconomic fields.
Repeatable to: 12 credits if content differs.

ECON721 Econometrics III (3 Credits)
Oriented towards macro-econometric methods. Topics covered will be selected from the following: Further discussion of topics covered in ECON624, nonlinear time series models, exogeneity and causality, non-stationary time series models (unit roots, co-integration, error correction models, vector autoregressive models), econometric models of volatility (ARCH and GARCH models, and Stochastic volatility models), rational expectations models, non-stationary panel data models, tests for structural change, Bayesian econometrics and methods for Bayesian computation.
Prerequisite: ECON624; or permission of BSOS-Economics department.

ECON722 Econometrics IV (3 Credits)
Oriented towards micro-econometric methods. Topics covered will be selected from the following: Further discussion of topics covered in ECON624, binary and multinomial response models, censored and truncated regression models, sample selection models, count data models, duration models program evaluation and treatment effects methods, structural econometrics, the identification problem, stratified and clustered samples, spatial/cross sectional dependence models, dynamic panel data models, weak instruments, non-parametric estimation, boot strap and Jack Knife methods, pre-test estimators.
Prerequisite: ECON624; or permission of BSOS-Economics department.

ECON741 Advanced International Economics I (3 Credits)
Exchange rate determination; exchange rate regimes; international monetary reform; policy conflict and cooperation; the LDC debt problem; pricing of international assets; balance of payments crises.
Prerequisite: ECON601; or permission of BSOS-Economics department.

ECON742 Advanced International Economics II (3 Credits)
Comparative advantage, Heckscher-Ohlin theory, specific-factors model, empirical verification, economies of scale, imperfect competition, commercial policy, factor mobility.
Prerequisite: ECON603; or permission of BSOS-Economics department.

ECON743 Topics in International Finance (3 Credits)
Puzzles in international finance; portfolio balance, current account dynamics, exchange rate behavior; capital market imperfections; balance of payments crises.
Prerequisite: ECON602; or permission of BSOS-Economics department.
Recommended: ECON741.

ECON744 Advanced Topics in International Economics (3 Credits)
This is an advanced course in the intersection of international finance, trade, and macroeconomics. The goal is to integrate topics from the three fields and to understand the links between individual/micro and aggregate/macro outcomes in real and financial markets. Topics include firm sale and pricing behavior, consumer choice and aggregate responses---trade elasticities, real exchange rate fluctuations, risk sharing, portfolio choice, asset pricing anomalies, and information frictions.
Prerequisite: ECON601 and ECON602.
Credit Only Granted for: ECON698M or ECON744.
Formerly: ECON698M.

ECON745 Advanced Topics in International Trade (3 Credits)
Designed primarily for students planning to write dissertations on a topic related to international trade. Its focus is on recent research in this field including tests of trade theories; the effects of trade on growth and knowledge diffusion; the political economy of trade policy and the theory and practice of trade agreements.
Prerequisite: ECON604 and ECON624.
Credit Only Granted for: ECON698L or ECON745.
Formerly: ECON698L.

ECON747 The Macreconomics of Imperfect Capital Markets (3 Credits)
After a brief overview of the micro-foundations of capital market imperfections, topics include limited commitment, the financial accelerator, liquidity, bubbles, crises, the role of credit in monetary economics as well as international capital flows.
Prerequisite: ECON602 and ECON601; or (ECON604 and ECON603); or permission of BSOS-Economics department.
Restriction: Must be in one of the following programs (Economics (Master's); Economics (Doctoral)).
Credit Only Granted for: ECON698K or ECON747.
Formerly: ECON698K.

ECON752 Public Economics II (3 Credits)
Theoretical and empirical issues in taxation, with particular emphasis on income taxation.
Prerequisite: ECON751.

ECON754 Topics in Political Economy I (3 Credits)
Study of political determinants of macroeconomic outcomes. Time inconsistency in monetary and fiscal policy, political business cycles. Political models of redistribution, delay in reform, transition, growth, and international policymaking.
Prerequisite: ECON602 and ECON604; or permission of BSOS-Economics department.

ECON756 Empirical Political Economics (3 Credits)
An introduction to empirical political economy. Determinants of individual political behavior and the impact of political rules on economic outcomes will both be analyzed. Modern applied econometric techniques will also be covered.

ECON757 Topics in Political Economy II (3 Credits)
A continuation of ECON754 Topics in Political Economy I. Topics will include: the informational role of special interest groups; campaign finance, including welfare analysis of campaign finance reform; advanced models of the political economy of redistribution, with emphasis on inefficient redistribution, intergenerational redistribution, and "pork barrel" politics; fairness and redistributive politics; the effects of alternative electoral systems; theoretical models of parliamentary democracies, government formation and political parties; accountability of government officials; and the political economy of federalism.
Prerequisite: ECON602 and ECON604; or permission of BSOS-Economics department.
Recommended: ECON754.

ECON771 Advanced Labor Economics: Theory and Evidence (3 Credits)
Modern analytical and quantitative labor economics. Labor supply decisions of individuals and households; human capital model and distribution of income. Demand for labor; marginal productivity theory, imperfect information and screening. Interaction of labor demand and supply; unemployment; relative and absolute wages; macroeconomic aspects of the labor market.
Prerequisite: ECON603 and ECON624; or permission of BSOS-Economics department.
Restriction: Must be in the Economics Doctoral program.

ECON772 Population Economics (3 Credits)
Covers the central ideas in population economics. These include theory and test of theories of mortality, fertility and immigration.
Prerequisite: ECON771; or permission of BSOS-Economics department.

ECON773 Topics in Applied Public and Labor Economics (3 Credits)
Explore topics in labor and public economics. Study the empirical evidence and the applied methodology used within labor and public economics. Discuss important topics in labor and public economics including immigration, education, discrimination, crime, and the role of family background. Provide instruction on how to perform empirical labor and public economic research by familiarizing students with available data sources, current research methodology, and practice with statistical packages such as Stata.
Prerequisite: ECON603, ECON604, and ECON623; and (ECON624 or ECON626).

ECON781 Valuing Environmental Benefits (3 Credits)
The theory and practice of valuing environmental benefits, including the health, recreation and aesthetic benefits associated with controlling air and water pollution, and the damages associated with climate change. Estimation of the benefits of energy efficiency improvements-including the benefits of fuel economy standards.
Prerequisite: ECON603; and ECON623. Or students who have taken courses with comparable content may contact the department.

ECON785 Advanced Economics of Natural Resources (3 Credits)
The use of exhaustible and renewable natural resources from normative and positive points of view. Analysis of dynamic resource problems emphasizing energy, mineral, groundwater, forestry, and fishery resources; optimal, equilibrium, and intergenerational models of resource allocation.
Prerequisite: ECON603, ECON604, and ECON624.

ECON799 Master's Thesis Research (1-6 Credits)

ECON808 Workshop on Macroeconomics, International Macroeconomics and International Finance (2 Credits)
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Restriction: Permission of BSOS-Economics department.
Repeatable to: 12 credits if content differs.

ECON818 Workshop in Microeconomic Theory (2 Credits)
Current research in microeconomic theory. Topics drawn from game theory, mathematical economics, and the economics of information and will include applications of the theory to diverse areas of economics. Specific topics: bargaining, auctions, mechanism design, signaling, general equilibrium, industrial organization theory, and financial markets theory.
Repeatable to: 12 credits if content differs.

ECON825 Advanced Economic Welfare Analysis (3 Credits)
Theory of economic welfare measurement, problems of path dependence in evaluating multiple price changes, welfare measurement under risk, general equilibrium welfare measurement with multiple distortions, and applications in evaluation of agricultural and resource policies.
Prerequisite: ECON604 and ECON603; or permission of BSOS-Economics department.
Credit Only Granted for: ECON825 or AREC825.

ECON828 Workshop in Econometrics (2 Credits)
Current research in econometrics. Topics drawn from theoretical and applied econometrics. Special topics include: maximum likelihood and generalized method of moments estimation of linear and non-linear models, analysis of stationary and non-stationary time series, cross section time series estimation, spatial estimation mehtods, Bayesian methods, semi-and non-parametic methods, rational expectations models, numerical methods, and various applications.
Repeatable to: 12 credits if content differs.

ECON848 Workshop in International Trade, Institutional Economics and Political Economy (2 Credits)
*
Restriction: Permission of BSOS-Economics department.
Repeatable to: 12 credits if content differs.

ECON858 Workshop in Public Economics (3 Credits)
Restriction: Permission of BSOS-Economics department.
Repeatable to: 6 credits if content differs.

ECON868 Workshop in Industrial Organization, Microeconomic Theory and Behavioral and Experimental Economics (2 Credits)
Workshops designed to provide a structured environment for our faculty and graduate students to meet regularly to discuss and present their research ideas.
Restriction: Permission of BSOS-Economics department.
Repeatable to: 12 credits if content differs.

ECON878 Workshop in Development, Labor and Public Economics (2 Credits)
*
Restriction: Permission of BSOS-Economics department.
Repeatable to: 12 credits if content differs.

ECON888 Workshop in Comparative Institutional Economics (2 Credits)
Current research in institutional economics and closely related fields such as economic transition, economic development, economic theory, law and economics, political economics, and economic history. Topics are drawn from both theoretical analysis of institutions and empirical studies of the effects and determinants of institutions.
Restriction: Permission of BSOS-Economics department.
Repeatable to: 12 credits if content differs.

ECON898 Pre-Candidacy Research (1-8 Credits)

ECON899 Doctoral Dissertation Research (1-8 Credits)

EDCI - Curriculum and Instruction

EDCI420 Student Teaching Seminar in Secondary Education: Social Studies (1 Credit)
An analysis of teaching theories, strategies, and techniques in the student teaching experience.
Prerequisite: EDCI426 and EDCI427.
Corequisite: EDCI421 and EDCI422.
Restriction: Minimum cumulative GPA of 2.75.

EDCI421 Student Teaching in Secondary Schools: Social Studies/History (12 Credits)
Prerequisite: Admission to teacher education program.
Corequisite: EDCI420.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching, Learning, Policy and Leadership department; and must be in Secondary Educ: Social Studies program.

EDCI422 Student Teaching in Secondary Schools: Social Studies/ Geography (12 Credits)
Prerequisite: EDCI321.
Corequisite: EDCI420.

EDCI428 Field Experience in Secondary Social Studies Teaching (1 Credit)
Practical experience as an aide to a regular social studies teacher; assigned responsibilities and participation in a variety of teaching/ learning activities. Students must reserve one full day per week for internship placement.
Corequisite: EDCI427.
Restriction: Must be in Secondary Educ: Social Studies program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI430 Student Teaching Seminar in Secondary Education: World Language (1 Credit)
An analysis of teaching theory, strategies and techniques in the internship experience.
Prerequisite: EDCI410 and EDCI433.
Corequisite: EDCI431 and EDCI474.
Restriction: Must be in Secondary Educ: Foreign Languages program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI431 Teaching Internship in Secondary Schools: World Language (12 Credits)
Practical experience as a full-time intern with a fully licensed World Language teacher in a diverse school setting; assigned professional responsibilities and participates in teaching/learning experiences.
Prerequisite: EDCI410 and EDCI433.
Corequisite: EDCI430 and EDCI474.
Restriction: Minimum cumulative GPA of 2.75; and must be in Secondary Educ: Foreign Languages program. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.
Additional Information: Internship lab fee applies. See current program description for details.

EDCI438 Field Experience in Second Language Education (1 Credit)
Practical experience as an aide to a regular foreign language teacher; assigned responsibilities and participation in a variety of teaching/learning activities.
Corequisite: EDCI330.
Restriction: Permission of EDUC-Teaching, Learning, Policy and Leadership department; and must be in Secondary Educ: Foreign Languages program.
Repeatable to: 3 credits if content differs.

EDCI440 Internship Seminar in Secondary Education: English (1 Credit)
A review and analysis of current instructional theories, strategies and best practice in relation to the teaching internship. Meets at area high school; location provided before first meeting.
Prerequisite: EDCI447 and EDCI467.
Corequisite: EDCI441 and EDCI474.
Restriction: Must be in Secondary Educ: English Language Arts program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI441 Internship in Secondary Schools: English (12 Credits)
Practical experience as a full-time intern with a fully licensed English teacher in a diverse school setting; assigned professional responsibilities and participates in teaching/learning experiences. Internship lab fee applies. See current program description for details.
Prerequisite: EDCI447 and EDCI467.
Corequisite: EDCI440 and EDCI474.
Restriction: Must be in Secondary Educ: English Language Arts program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI447 Field Experience in English Teaching (1 Credit)
Practical experience as a part-time intern working with a fully licensed English teacher in a diverse school setting. Students must reserve one full day or two half days per week for the part-time internship.
Corequisite: EDCI467.
Restriction: Must be in Secondary Educ: English Language Arts program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI448 Student Teaching in Secondary Schools: Theatre/English (12 Credits)
Practical experience as an aide to a regular English, speech or drama teacher; assigned responsibilities and participation in a variety of teaching/learning activities.
Prerequisite: EDCI417.
Corequisite: EDCI440.
Restriction: Must be in Secondary Educ: English Language Arts program.

EDCI450 Internship Seminar in Secondary Education: Mathematics (1 Credit)
Strategies and techniques in the internship experience. Structured work on teaching portfolio (requirement for graduation and certification). Place, day, and time to be arranged.
Prerequisite: EDCI457 and EDCI455.
Corequisite: EDCI451 and EDCI474.
Restriction: Must be in Secondary Educ: Mathematics program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI460 Student Teaching: Middle School (12 Credits)
A Middle-school student teaching experience in two content areas.
Prerequisite: EDCI413.
Corequisite: EDCI414 and EDCI425.
Restriction: Minimum cumulative GPA of 2.5; and permission of EDUC-Teaching, Learning, Policy and Leadership department; and for Middle School Education majors only.

EDCI464 Assessment for Reading (3 Credits)
Examination of reading assessment theory, materials and procedures; Topics include validity and reliability in reading assessment, formal and informal assessment, reading instruction that is informed by ongoing assessment, and the effects of assessment on students and schooling in a diverse society.
Prerequisite: EDCI362.
Restriction: Senior standing. And must be in Elementary Education program; or must be in Early Childhood Education program.

EDCI471 Internship in Secondary Schools: Science (12 Credits)
Practical experience as a full-time intern with a fully licensed science teacher in a diverse school setting; assigned professional responsibilities and participates in teaching/learning experiences. Internship lab fee applies. See current program description for details.
Prerequisite: EDCI470.
Corequisite: EDCI480 and EDCI474.
Restriction: Must be in Secondary Educ: Science program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI474 Teaching Academically, Culturally, and Linguistically Diverse Students in Secondary Education (2 Credits)
Multi-disciplinary capstone course for Secondary Education majors. Discussion of pedagogical and content issues relevant for teaching academically, culturally, and linguistically diverse students with particular emphasis on students with special educational needs and English language learners. Students develop and use curriculum-based assessments and/or lessons with these groups of students.
Corequisite: Enrolled in internship/certification area.
Restriction: Must be in one of the following programs (Secondary Educ: Science; Secondary Educ: English Language Arts; Secondary Educ: Mathematics; Secondary Educ: Foreign Languages; Secondary Educ: Social Studies; Secondary Educ: Art) ; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI481 Student Teaching: Elementary (12 Credits)
Prerequisite: EDCI352, EDCI362, EDCI342, EDCI372, and EDCI322.
Corequisite: EDCI464.
Restriction: Permission of EDUC-Teaching, Learning, Policy and Leadership department; and must be in Elementary Education program; and minimum cumulative GPA of 2.75.

EDCI497 The Study of Teaching (3 Credits)
Identification and examination of learner and teacher outcome variables related to teaching systems, methods, and processes. Methods of conducting classroom research.
Prerequisite: EDCI481.
Corequisite: EDCI489.

EDCI498 Special Problems in Teacher Education (1-6 Credits)
Individual study of approved problems.
Restriction: Must be in a major within EDUC-Teaching, Learning, Policy and Leadership department; or must be in Curriculum and Instruction (Doctoral) program; or must be in Curriculum and Instruction (Master's) program; or permission of EDUC-Teaching, Learning, Policy and Leadership department.
Repeatable to: 6 credits.

EDCI499 Workshops, Clinics, and Institutes (1-6 Credits)
The following types of educational enterprise may be scheduled under this course heading: workshops conducted by the College of Education (or developed cooperatively with other colleges and universities) and not otherwise covered in the present course listing; clinical experiences in pupil testing centers, reading clinics, speech therapy laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups such as school superintendents, principals and supervisors.
Repeatable to: 6 credits.

EDCI618 Proseminar for Teaching Internship (1-3 Credits)
Supports and complements candidates' internship experiences. Extends skills in implementing less plans (lesson planning), culturally competent teaching, classroom management, issues of professionalism, and protfolio development.
Prerequisite: Admission to a masters certification program in EDCI.
Corequisite: Participation in an arranged school placement.
Formerly: EDCI688E.

EDCI619 Developing a Professional Portfolio (1-3 Credits)
Students will examine issues of performance assessment and develop professional portfolios following the guidelines established by the National Board for Professional Teaching Standards. Drawing on the research data collected throughout their program and relying on inquiry, reflections, and analysis, they will synthesize and present the body of their teaching experience.
Repeatable to: 3 credits.
Credit Only Granted for: EDCI614 or EDCI619.

EDCI637 Internship in World Language/TESOL Education (2-6 Credits)
Practical experience as a full-time intern with a fully licensed World Language/TESOL teacher in a diverse school setting; assigned professional responsibilities and participates in teaching/learning experiences.
Prerequisite: EDCI434 and EDCI634; or permission of EDUC-Teaching, Learning, Policy and Leadership department.
Additional Information: Internship lab fee applies. See current program description for details.

EDCI694 Transformative Pedagogy and School Subjects (3 Credits)
Examines the potential of various pedagogoies to be transformative in relation to school subject matters, school identities, and school contexts.

EDCI788 Selected Topics in Teacher Education (1-3 Credits)
Current topics and issues in teacher education.
Repeatable to: 6 credits if content differs.

EDCI790 Epistemological Bases of Education Research (3 Credits)
A course on research theory, method, and design issues for doctoral students. Focuses on conceptual and theoretical understanding of methodology, the broad rand of both qualitative and quantitative methodologies, and underlying epistemologies as they apply to the study of schools, curriculum, teaching, and teacher education.
Prerequisite: EDCI780.

EDCI798 Special Problems in Teacher Education (1-6 Credits)
Intended for Masters, AGS, or doctoral students in education who desire to pursue a research problem.
Restriction: Permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI799 Master's Thesis Research (1-6 Credits)

EDCI822 Seminar in Secondary Education (3 Credits)

EDCI888 Apprenticeship in Education (1-8 Credits)
Apprentice practice under professional supervision. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate-seeking graduate students.
Restriction: Permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI889 Internship in Education (3-8 Credits)
Internship experiences with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Teaching, Learning, Policy and Leadership department.

EDCI898 Pre-Candidacy Research (1-8 Credits)

EDCI899 Doctoral Dissertation Research (1-8 Credits)

EDCP - Education Counseling and Personnel Services

EDCP411 Principles of Mental Health (3 Credits)
Mechanisms involved with personal adjustment, coping skills, and the behaviors that lead to maladjustment.
Prerequisite: 9 semester hours in the behavioral sciences; or permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP420 Advanced Topics in Human Diversity and Advocacy (3 Credits)
This course will build upon students' knowledge of diversity in American society and will examine contemporary topics related to multiculturalism in educational and community contexts as well as strategies for advocacy in such venues. This course fulfills CORE requirements in diversity.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP462 Disability in American Society (3 Credits)
Critical examination of the history of discrimination and analysis of current policies toward people with severe physical and mental disabilities.
Restriction: Must have earned a minimum of 30 credits; and sophomore standing or higher.

EDCP489 Field Experiences in Counseling and Personnel Services (1-4 Credits)
Planned field experience in education-related activities. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP498 Special Problems in Counseling and Personnel Services (1-3 Credits)
Available only to major students who have formal plans for individual study of approved problems.
Prerequisite: Available only to major students who have formal plans for individual study of approved problems.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP499 Workshops, Clinics, Institutes (1-6 Credits)
The following type of educational enterprise may be scheduled under this course heading: workshops conducted by the Department of Counseling and Personnel Services (or developed cooperatively with other departments, colleges and universities) and not otherwise covered in the present course listing; clinical experiences in counseling and testing centers, reading clinics, speech therapy laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups.
Repeatable to: 6 credits.

EDCP605 Developmental Issues in Counseling Adults (3 Credits)
Theoretical approaches to adult development. The scope and variety of settings (industry, education, government) in which programs of adult counseling and guidance take place, and the nature of such programs.

EDCP610 Professional Orientation (3 Credits)
Survey of knowledge base and practices in counseling and personnel services specializations, professional ethics, credentialling relevant legislation, current issues.

EDCP611 Career Development Theory and Programs (3 Credits)
Research and theory related to career and educational decisions; programs of related information and other activities in career decision.

EDCP612 Multicultural Issues in Counseling and Personnel Services (3 Credits)
Socio-psychological, philosophical, clinical, and research topics related to the provision of counseling and personnel services, academic support, and career development for minority students on predominantly white college and university campuses. Implications of race and/or national origin on opportunities for personal, social, academic, and career development in educational settings.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP614 Counseling Skills: Introduction to Practicum (3 Credits)
Development and utilization of counseling skills.
Corequisite: EDCP616.

EDCP615 Counseling I: Appraisal (3 Credits)
Collection and interpretation of appraisal data, synthesis of data through case study procedures. Development of interview skills.
Corequisite: EDCP618.
Restriction: Must be in a major within EDUC-Counseling, Higher Education and Special Education department.

EDCP616 Counseling II: Theory and Practice (3 Credits)
Counseling theories and the practices which stem from such theories.
Corequisite: EDCP614.

EDCP617 Group Counseling (3 Credits)
A survey of theory, research and practice of group counseling and psychotherapy, with an introduction to growth groups and the laboratory approach, therapeutic factors in groups, composition of therapeutic groups, problem clients, therapeutic techniques, research methods, theories, ethics and training of group counselors and therapists.
Prerequisite: EDCP616.

EDCP619 Practicum in Counseling (2-6 Credits)
Sequence of supervised counseling experiences of increasing complexity. Limited to eight applicants in advance. Two hours class plus laboratory.
Prerequisite: EDCP616.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP620 Introduction to Mental Disorders (3 Credits)
Understanding diagnosis and assessment of mental, addictive, and co-occurringmental/addictive disorders, using the diagnostic criteria of the most prevalent psychiatricdisorders as specified by the American Psychiatric Association Diagnostic and Statistical Manuals.
Credit Only Granted for: EDCP789W or EDCP620.
Formerly: EDCP789W.

EDCP621 Practicum in School Counseling (3-6 Credits)
Sequence of supervised counseling experiences of increasing complexity.
Prerequisite: EDCP616.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDCP619D or EDCP621.
Formerly: EDCP619D.

EDCP622 Human Development in the Counseling Context (3 Credits)
An examination of the development of individuals over the lifespan. A focus on human development theories and the ways in which those theories are utilized within the counseling process to promote optimal development of individuals and families across the lifespan.
Credit Only Granted for: EDCP789X or EDCP622.
Formerly: EDCP789X.

EDCP625 Counseling the Chemically Dependent (3 Credits)
Chemical dependency and its effects on the individual's personal, social, and work functioning. Counseling procedures for persons with drug and alcohol problems.
Restriction: Must be in the School Counseling program; or permission of instructor.

EDCP627 Process Consultation (3 Credits)
Study of case consultation, systems consultation, mental health consultation and the professional's role in systems intervention strategies.
Prerequisite: Graduate course in group process.

EDCP630 School-Based Behavioral Interventions (3 Credits)
Behavior assessment and intervention techniques from behavioral, cognitive-behavioral, and ecological models. Planning, implementation, and evaluation of behavior change techniques.
Restriction: Permission of instructor; and must be in a major in EDUC-College of Education.

EDCP631 Serving Culturally and Linguistically Diverse Clients in the Schools (3 Credits)
Conceptual and empirical literature about racially, ethnically, culturally, and linguistically diverse clients. Examination and integration of cross-cultural literature.
Restriction: Must be in the School Psychology or Counselor Education programs.

EDCP632 Cognitive Assessment (3 Credits)
Assessment of cognitive functioning of children and adolescents in reference to school learning and behavior problems. Administering, scoring and interpreting cognitive assessment instruments commonly used in school systems.
Restriction: Must be in the School Psychology program; or permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP633 Diagnostic Appraisal of Children I (3 Credits)
Assessment of development, emotional and learning problems of children.
Prerequisite: EDCP632.

EDCP635 School Consultation I (3 Credits)
Theory and practice of consultation services in the school setting. Understanding of school culture. Introduction to problem solving model of case consultation for assessment and remediation of learning and behavior problems in the classroom. Practicum experience.
Restriction: Must be in the School Counseling program; or must be in the School Psychology program; or permission of instructor.

EDCP636 School Consultation II (3 Credits)
Didactic practicum in consultation services in the school setting. Case consultation and organizational consultation in the schools. Practicum experience.
Prerequisite: EDCP635.
Restriction: Must be in the School Psychology program; or permission of instructor.

EDCP640 School Psychology Seminar: Overview of the Specialty (1-2 Credits)
Overviews the specialty of school psychology, including history of the specialty, roles and functions of school psychologists, and current professional issues related to the specialty.
Restriction: Must be in the School Psychology program; or permission of instructor.

EDCP641 School Psychology Seminar: Professional Ethics (1-2 Credits)
Overviews ethical issues in the specialty of school psychology.
Restriction: Must be in the School Psychology program; or permission of instructor.

EDCP651 Group Counseling in Schools (3 Credits)
Issues and techniques of group counseling in schools.
Prerequisite: EDCP616; and for school counseling and school psychology students only.
Restriction: Permission of instructor.

EDCP652 Research in Counseling (3 Credits)
An exploration of basic and applied research, program evaluation, and associated measurement and evaluation skills crucial for professional school counselors.
Restriction: Must be in the School Counseling program.
Credit Only Granted for: EDCP652 or EDCP789Y.
Formerly: EDCP789Y.

EDCP654 History of Psychological Science (3 Credits)
This course, intended for doctoral students in psychology, explores the historical development of psychological science and practice. Students will examine and discuss the original writings of persons involved in the making of psychology and of historians and others who have described and interpreted historical developments in psychology-as well as historical developments that influenced the making of psychology. The focus will be on understanding how the social, cultural, political and legal context of the times; developments in psychology and other sciences; technological advances; the evolution of the educational and scientific infrastructure; funding; and the growth in numbers of persons involved in psychological science and mental health have influenced psychology and been influenced by psychology. In other words, we will examine how psychological ideas about human nature, mental life, and behavior influence social and political events and arrangements as well as how social and political contexts influence psychological thinking and research.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDCP654 or EDCP789F.
Formerly: EDCP789F.

EDCP662 Psychosocial and Medical Aspects of Disability (3 Credits)
Appraisal and understanding of the psychosocial and medical aspects of disability and chronic illness, including their nature, causes, functional aspects and treatment; understanding of how psychological and social factors influence the adjustment processes in disability.
Prerequisite: EDCP610; or students who have taken courses with comparable content may contact the department.

EDCP663 Rehabilitation and Treatment of Mental and Emotional Disorders (3 Credits)
Purpose and principles of rehabilitation and treatment methods of adolescents and adults with significant mental health disorders and dual diagnoses. Focus is on the individual as well as the family. The course includes information regarding etiology, assessment, treatment interventions, program planning, and program evaluation.
Prerequisite: EDCP610; or permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP665 Family and Social Support Systems (3 Credits)
Principles and methods useful for understanding the role of family support systems in counseling. Specialized skills for counseling impaired adults and their families.
Recommended: EDCP610.

EDCP668 Special Topics in Rehabilitation (1-6 Credits)
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Repeatable to: 6 credits if content differs.

EDCP669 Professional Issues in Counseling Psychology (1 Credit)
Introduction to counseling psychology, including history and developmen of the field, and current professional and scientific issues. Exploration of career, research, and professional development opportunities.
Prerequisite: Must be in the Counseling Psychology program.
Repeatable to: 3 credits if content differs. Cross-listed with PSYC669.
Formerly: EDCP695.

EDCP672 Social & Cognitive Foundations of Counseling & School Psychology (3 Credits)
In depth examination of theoretical approaches and issues of social and cognitive psychology.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDCP672 or EDCP789E.
Formerly: EDCP789E.

EDCP680 Basic Didactic Practicum in Counseling Psychology (3 Credits)
In depth examination of counseling theories and techniques, and supervised experience in application of a range of counseling and therapy approaches.
Prerequisite: For Counseling Psychology majors only.
Formerly: PSYC776.

EDCP682 Counseling Psychology Didactic Practicum in Group Interventions (3 Credits)
In depth examination of theories and techniques of group interventions; supervised experience in group counseling.
Prerequisite: For Counseling Psychology majors only. Cross-listed with PSYC682.
Formerly: EDCP718.

EDCP684 Counseling Psychology Didactic Practicum in Consultation (3 Credits)
In depth examination of theories and techniques of consultation on and off university campuses; supervised experience on conducting consultation.
Prerequisite: For Counseling Psychology majors only.
Formerly: EDCP789K.

EDCP685 Counseling Psychology Didactic Practicum in Counseling Supervision (3 Credits)
In depth examinatin of theories and techniques of counseling supervision, supervised experience in the process of supervising counselors.
Prerequisite: For Counseling Psychology majors only. Cross-listed with PSYC685.
Formerly: EDCP745.

EDCP686 Counseling Psychology Didactic Practicum in Career Interventions (3 Credits)
In depth examination of theorectical approaches and issues in career interventions; supervised experience in career counseling and assessment.
Prerequisite: For Counseling Psychology majors only.
Formerly: EDCP777.

EDCP689 Seminar in Counseling Psychology (3 Credits)
Special topics in counseling psychology. Examples of topics include multicultural counseling, the counseling relationship, counseling and victimology, psychology treatment and health.
Prerequisite: For Counseling Psychology majors only.
Repeatable to: 12 credits if content differs. Cross-listed with PSYC689.
Formerly: EDCP789.

EDCP690 Research in Counseling Psychology I (3 Credits)
Critical analysis of strategies, methodological, conceptual, and content trends.
Prerequisite: For Counseling Psychology majors only. Cross-listed with PSYC690.
Formerly: EDCP778.

EDCP691 Research in Counseling Psychology II (3 Credits)
Critical analysis of trends and issues in counseling psychology science.
Prerequisite: For Counseling Psychology majors only. Cross-listed with PSYC691.
Formerly: EDCP717.

EDCP692 Assessment in Counseling Psychology I (3 Credits)
Broad introduction to the construction of psychological tests and measures, and experience in test interpretation, with consideration of historical, legal, ethical, and cultural issues surrounding the assessment process.
Prerequisite: For Counseling Psychology majors only. Cross-listed with PSYC692.
Formerly: EDCP789F.

EDCP693 Assessment in Counseling Psychology ii (3 Credits)
Supervised experience in administration, scoring, and interpreting major psychodiagnostic instruments used by counseling psychologists, as well as writing integrative assessment reports. Emphasis on hypothesis testing approach to assessment and on the counseling interview as an assessment tool.
Prerequisite: For Counseling Psychology majors only.
Formerly: EDCP789F.

EDCP694 Student Leadership Development (3 Credits)
Explores the development of leadership among college students including the study of leadership theory; a focus on how leadership is learned and developed; cultural dimensions of leadership; and exposure to the current national scene in leadership associations, programs, and resources.
Credit Only Granted for: EDCP694 or EDCP789D.
Formerly: EDCP789D.

EDCP695 Ethical and Professional Issues in Counseling Psychology (3 Credits)
Exploration of ethical and professional issues in Counseling Psychology.
Prerequisite: Must be in the Counseling Psychology program. Also offered as: PSYC695.
Credit Only Granted for: EDCP669, EDCP688, EDCP695, PSYC688, or PSYC695.
Formerly: EDCP669 and EDCP688.

EDCP697 Multicultural Issues in Counseling Psychology (3 Credits)
Exploration of knowledge, attitudes and skills for providing counseling and psychological services to culturally diverse populations.
Prerequisite: Only open to Counseling Psychology majors.
Credit Only Granted for: EDCP697, EDCP699, or PSYC697.
Formerly: EDCP699.

EDCP698 advanced Didactic Practicum in Counseling Psychology (3 Credits)
In depth examination of approaches to or theories abouth intervention, and supervised experience in the application of those approaches or theories. Each practicum focuses on a particular approach, e.g., psychodynamic, cognitive-behavioral, cross-cultural.
Prerequisite: For Counseling Psychology majors only.
Repeatable to: 12 credits if content differs. Cross-listed with: PSYC698.
Formerly: EDCP776.

EDCP700 Theories and Strategies of Counseling Psychology (3 Credits)
Introduction to the professional field, examination of pertinent scientific and philosophical backgrounds, and survey of the major theories, principles, and training models in counseling. Correlated laboratory analogue experiences in dydactic and group interrelationships.
Prerequisite: For Counseling Psychology majors only. Cross-listed with PSYC700.
Formerly: EDCP789J.

EDCP701 Theories and Methods of Intervention (3 Credits)
An in-depth review of different theories and methods related to psychological interventions for children and adolescents.
Restriction: Must be in Counseling and Personnel Services (Doctoral) program; or permission of instructor.
Credit Only Granted for: EDCP789B or EDCP701.
Formerly: EDCP789B.

EDCP715 Appraisal Measures in Counseling (3 Credits)
Prerequisites: EDCP 615 and EDMS 646 or their equivalents. Interpretation and utilization in counseling of the career interest and personality measures.
Prerequisite: EDCP615 and EDMS646; or students who have taken courses with comparable content may contact the department.

EDCP716 Advanced Counseling Theory Seminar (3 Credits)
Systematic investigation of methods of theory analysis and their application to counseling theory.
Prerequisite: Master's degree in counseling; or permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP717 Evaluation of Research in Counseling (3 Credits)
Research on process and outcome in counseling. A review of research and appropriate research methodologies.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP718 Advanced Seminar in Group Processes (2-6 Credits)
Prerequisite: Must have completed EDCP626.
Repeatable to: 6 credits.

EDCP738 Practicum in Child Assessment (1-6 Credits)
Administration of complete test batteries to children; supervision of initial interviews; test administration and scoring; interpretation and synthesis of test battery and interview material; the psychological report; verbal interpretation of test results; and recommendations. Taken initially with EDCP 633; repeated with EDCP 634 in the subsequent semester.
Corequisite: EDCP633 and EDCP634.
Restriction: Must be in the School Psychology program; or permission of instructor.
Repeatable to: 6 credits.

EDCP741 Multicultural Practice in Student Affairs: Self, Education, and Society (3 Credits)
Develop knowledge and skills in the area of multicultural practice in student affairs through the examination of oppression, power, and privilege and how these dynamics impact individuals, educational institutions, and societies.
Prerequisite: EDCP771.
Credit Only Granted for: EDCP741 or EDCP789Z.
Formerly: EDCP789Z.

EDCP742 Examining College Environments and Outcomes (3 Credits)
Explores theory and research on the impact of the college environment on undergraduate student outcomes. Discusses environmental theory and assessment, college impact theory, outcomes assessment, and implications of the above for higher education and student affairs.
Prerequisite: EDMS651; or permission of instructor.
Credit Only Granted for: EDCP742 or EDCP789K.
Formerly: EDCP789K.

EDCP743 Developmental Psychopathology (3 Credits)
Explore psychopathology from a developmental perspective and with an emphasis on affective bases of behavior
Restriction: Must be in Counseling and Personnel Services (Doctoral) program; or permission of instructor.
Credit Only Granted for: EDCP789Q or EDCP743.
Formerly: EDCP789Q.

EDCP745 Supervision of Counseling (3 Credits)
Survey of knowledge base, research approaches, and applied skills in supervision of counseling.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department; and must be in a major within EDUC-Counseling, Higher Education and Special Education department.

EDCP746 Clinical Supervision of Pupil Personnel Services (3 Credits)
Supervision of role of psychologists and counselors in school settings; applied skills in supervision of services.
Prerequisite: Advanced Doctoral Students Only.
Restriction: Permission of instructor.

EDCP750 Therapeutic Approaches with Children (3 Credits)
Theoretical and empirical underpinnings of the therapeutic process with children.
Restriction: Must be in Counseling and Personnel Services (Doctoral) program; or permission of instructor.
Credit Only Granted for: EDCP789N or EDCP750.
Formerly: EDCP789N.

EDCP770 Service-Learning and College Student Development (3 Credits)
Historical roots, concepts, and principles of practice of service-learning in higher education; includes community service component.
Credit Only Granted for: EDCP770 or EDCP789Y.
Formerly: EDCP789Y.

EDCP772 Research in Student Affairs (3 Credits)
Research designs and approaches to research in student development and higher education. Development of research for research competency or dissertation proposal.
Prerequisite: EDCP656; or permission of instructor.
Restriction: Must be in the College Student Personnel program.

EDCP774 Advanced Seminar in Theories of College Student Development (3 Credits)
An opportunity for in-depth study, dialogue, and reflection about theoretical frameworks for understanding the development of college students. Specific attention is given to enhancing knowledge and understanding of the development of students when social identities and their intersections are considered.
Prerequisite: EDCP771; or students who have taken courses with comparable content may contact the department.

EDCP775 Facilitating Student Learning in Higher Education (3 Credits)
Application of selected models of college student development, learning styles, and related models of instruction to the assessment of characteristics and the design of learning environments.
Prerequisite: EDCP771; or permission of EDUC-Counseling, Higher Education and Special Education department.
Restriction: Must be in Counseling and Personnel Services (Doctoral) program.

EDCP776 Social Justice in Student Affairs and Higher Education (3 Credits)
An exploration of differences, biases, assumptions, limitations, and challenge with diversity in the context of higher education and student affairs. Focusing on issues of inequities with social identity group membership and the systems of power, privilege, and oppression in society.
Prerequisite: EDCP771 or EDCP741; or permission of instructor.
Restriction: Limited to college student personnel students only.

EDCP778 Research Proposal Seminar (3 Credits)
The development of thesis, dissertation or other research proposals.

EDCP788 Advanced Practicum (1-6 Credits)
Individual supervision in one of the following areas: (a) individual counseling, (b) group counseling, (c) consultation, or (d) administration.
Prerequisite: Previous practicum experience.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP789 Advanced Topics in Counseling and Personnel Services (1-6 Credits)
Repeatable to: 6 credits.

EDCP797 Capstone Course: Program Planning (3-6 Credits)
Restriction: Must be in the School Counseling program.
Credit Only Granted for: EDCP789T or EDCP797.
Formerly: EDCP789T.

EDCP798 Special Problems in Counseling and Personnel Services (1-6 Credits)
Master's AGS, or doctoral candidates who desire to pursue special research problems under the direction of their advisers may register for credit under this number.
Prerequisite: Master's AGS, or doctoral candidates who desire to pursue special research problems under the direction of their advisers may register for credit under this number.

EDCP799 Master's Thesis Research (1-6 Credits)
Registration required to the extent of six hours for Master's thesis.

EDCP870 Professional Issues Seminar (3 Credits)
Examination of issues that bear on professional issues such as ethics, inter-professional relationships and research.
Credit Only Granted for: EDCP656 or EDCP870.
Formerly: EDCP656.

EDCP871 Student Affairs Doctoral Capstone Seminar (3 Credits)
Broadening perspectives on issues in student affairs and higher education by exploring the multiple roles and responsibilities of campus administrators and faculty members.
Prerequisite: EDCP870; or permission of instructor.
Restriction: Must be in the College Student Personnel program.
Credit Only Granted for: EDCP789I or EDCP871.
Formerly: EDCP789I.

EDCP879 Internship in School Counseling (4-8 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate-seeking graduate students.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Repeatable to: 9 credits.
Credit Only Granted for: EDCP888G or EDCP879.
Formerly: EDCP888G.

EDCP888 Apprenticeship in Counseling and Personnel Services (1-8 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate-seeking graduate students.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDCP889 Internship in Counseling and Personnel Services (1-8 Credits)
Internship experiences at a professional level of competence in a particular role with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Prerequisite: Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Repeatable to: 8 credits if content differs.

EDCP898 Pre-Candidacy Research (1-8 Credits)

EDCP899 Doctoral Dissertation Research (1-8 Credits)
Registration required to the extent of 12-18 hours for a Ph.D. Dissertation.

EDHD - Education, Human Development

EDHD400 Introduction to Gerontology (3 Credits)
Multidisciplinary survey of the processes of aging. Physiological changes, cultural forces, and self-processes that bear on quality of life in later years. Field study of programs, institutions for elderly, individual elders, their families and care providers.

EDHD401 Promoting Optimal Aging (3 Credits)
Theoretical, research, and applied issues related to optimal aging from psychological, biological, and societal perspectives. Group or individual projects involving direct field experiences.
Prerequisite: EDHD320; or EDHD400; or permission of EDUC-Human Development and Quantitative Methodology department.
Credit Only Granted for: EDHD401 or EDHD641.

EDHD402 Social Development (3 Credits)
Social Development. Critical concepts and ideas of the study of child and adolescent social development. Focus on changes in interpersonal relationships, emotions, achievement-related behavior and competence, and functioning within the broader social context.
Recommended: EDHD411.

EDHD411 Child Growth and Development (3 Credits)
Theoretical approaches to and empirical studies of physical, psychological and social development from conception to puberty. Implications for home, school and community.

EDHD412 Infant Development (3 Credits)
Infant development across domains, including perceptual, motor, cognitive, language, social and emotional functioning from pre-natal through third year of life.

EDHD413 Adolescent Development (3 Credits)
Adolescent development, including special problems encountered in contemporary culture. Observational component and individual case study.

EDHD414 Development of the Scientific Mind Across the Lifespan (3 Credits)
Study of the educational, cognitive, social, and cultural factors that underlie the development of the scientific mind across the lifespan.
Recommended: EDHD320.

EDHD415 Promoting the Social-Emotional Competence of Young Children in Inclusive Classrooms (3 Credits)
Teachers must have knowledge and skill regarding how to appropriately manage the classroom so that all children, those with and without disabilities, will be able to learn from their school experiences. Classroom management extends beyond responding to student misbehavior to include a comprehensive approach to addressing the social/emotional competence of typically and atypically developing children. The goal of this course is to prepare early childhood teachers who are able to sensitively, responsively, and effectively manage a classroom of young students who are typically developing and those who have disabilities. Includes Field Experience.
Prerequisite: EDHD314 and EDHD425; and (EDHD419 or EDSP420).
Corequisite: EDSP423, EDSP424, and EDHD431.
Restriction: Must be in the Professional Early Childhood/Early Childhood Special Education program; and junior standing or higher; and minimum cumulative GPA of 2.75.

EDHD420 Cognitive Development and Learning (3 Credits)
Current developmental theories of cognitive processes such as language, memory, and intelligence and how differences in cognitive level (infancy through adolescence) mediate learning of educational subject matters.
Prerequisite: EDHD320, EDHD411, PSYC341, or PSYC355; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD421 Peer Relations (3 Credits)
Historical and theoretical underpinnings to contemporary research on peer interactions, relationships, and groups. Focus on (1) inter-dependencies of individual characteristics, social behaviors, social relationships; (2) relations between familial factors and extra-familial peer interactions and relationships; (3) normal and abnormal peer relationships; and (4) cross cultural universals and differences.
Recommended: EDHD411.

EDHD424 Culture, School & Community: Contexts for Learning (PreK-3rd) (3 Credits)
Explores the development of the young child (with and without disabilities, as well as those at environmental risk) in the context of the family and community, with emphasis on the impact of state, federal and school system policy on the child's world. Course will consider issues within the family, and the wider socio-cultural ecology that relate to the child's ability to develop and learn. In addition, students will develop strategies for respectful and culturally responses approaches to actively engage families in their children's development and learning. Includes Field Experience.
Prerequisite: EDHD425 and EDHD314; and (EDHD419 or EDSP420).
Corequisite: EDSP315, EDHD431, EDHD415, and EDSP423.
Restriction: Must be in the Professional Early Childhood/Early Childhood Special Education program; and junior standing or higher; and minimum cumulative GPA of 2.75.

EDHD425 Language Development and Reading Acquisition (3 Credits)
This course focuses on young children's language development and the relationship between language and reading acquisition. Students will learn: concepts central to language development; language achievements at different ages; concepts of emergent literacy; models of reading acquisition and skilled reading.

EDHD426 Cognitive and Motivational Literacy Content (3 Credits)
Students preparing for secondary teaching will learn about the cognitive and motivational aspects of literacy and learning from text for the content areas of literature, science, history and mathematics. Different evidenced-based literacy approaches appropriate for content learning are presented. Characteristics of learning environments that enable students to engage productively with diverse texts, disciplinary tasks, and technological resources in content areas are identified.

EDHD427 Constructing and Integrating the Early Childhood Curriculum (3 Credits)
Explores the world from the child's perspective and constructs curriculum based on cognition, learning, and children's experiences. The integrated curriculum is the overarching framework for this course. Includes field experience.
Prerequisite: EDHD314, EDHD313, EDHD424, and EDSP470.
Corequisite: EDHD323, EDHD322, EDHD315, EDHD321, and EDHD435.
Restriction: Must be in Early Childhood Education program; and senior standing.

EDHD430 Adolescent Violence (3 Credits)
Examines the roots of violence among adolescents and the extent to which this constitutes a problem in various settings. Research studies on its origins, prevention and intervention and implications for social policy are examined.
Prerequisite: PSYC100; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD431 Child Development and Learning, Three to Eight Years (3 Credits)
Provides a basic understanding of child development theory and research, as well as specific knowledge about the development of children during the early and middle childhood "stages," specifically from ages 3 years to 8 years. A major emphasis will be the application of theory and research from the field of educational psychology to an understanding of how young children learn and achieve academically. Because the course will address the developmental and academic functioning of children with and without disabilities, a particular focus will be on individualization.
Prerequisite: Minimum grade of C- in EDHD314 and EDHD425; and 1 course with a minimum grade of C- from (EDHD419, EDSP420).
Corequisite: EDSP423 and EDSP315; and TRACK I: Must be concurrently enrolled in EDSP430, EDSP433; or TRACK 2: Must be concurrently enrolled in EDHD415, EDHD424.

EDHD432 Internship in EC/ECSE (12 Credits)
Interns spend five days per week in the classroom/home-based setting (under the mentorship of a certified teacher) where they gradually assume full responsibility for the planning, delivery and assessment of instruction or an intervention. Track I students will have an Infant/Toddler placement with special educator, Track II students will be in a Pre-K/K or Grade 1,2,3 classroom with general or special educator (must be opposite grade level and mentor from Phase I/fall of the senior year).
Prerequisite: EDHD323, EDHD322, EDSP417, EDHD441, EDHD442, EDHD443, EDHD444, and EDSP321.
Corequisite: EDHD437.
Restriction: Must be in Early Childhood and Early Childhood Special Education program; and senior standing or higher.

EDHD434 Child Development, Birth to Three Years (3 Credits)
Designed to provide students with an understanding of child development theory and research, as well as knowledge about typical and atypical development of children from birth to three years of age. The course emphasizes learning for children with and without disabilities, and for children who are at risk due to poverty and other environmental factors. The course will introduce how children develop and the challenges they face within the domains of physical, cognitive, language, social, and emotional development, with particular attention paid to the impact of risk factors on development. Students will become familiar with delays and differences in development that may occur as the result of disability. Finally, students will learn the effects of cultural and linguistic differences on growth and development. Information about theory and research in child development for children with and without disabilities will be enhanced through a series of observational experiences, which will build upon concepts addressed during class. Includes field experiences.
Prerequisite: EDHD210, EDHD220, and EDSP211.
Corequisite: EDHD314 and EDHD425. Cross-listed with EDSP420.
Credit Only Granted for: EDHD419A, EDSP420 or EDHD434.
Formerly: EDHD419A.

EDHD435 Effective Components of the Early Childhood Classroom (3 Credits)
Explores three topics integral to effective, child-centered early childhood classrooms: assessment, classroom management and parent involvement. Includes field experience.
Prerequisite: EDHD419, EDHD314, EDHD313, EDHD424, and EDSP470.
Corequisite: EDHD323, EDHD322, EDHD315, EDHD321, and EDHD427.
Restriction: Must be in Early Childhood Education program; and senior standing or higher.

EDHD436 Cognition and Motivation in Content Area Literacy for Middle-School Students (3 Credits)
Cognitive and motivational processes of literacy and learning from texts across subjects. Structured approaches to using reading, writing, and speaking for content learning based on approaches to knowledge, motivation, and strategies. Classroom contexts that enable middle-school students to engage with diverse texts and Internet resources are provided

EDHD437 EC/ECSE Teachers as Researchers and Reflective Practitioners (3 Credits)
Students use action research to improve instructional delivery or familial interactions in an effort to enhance the overall educational experiences/outcomes of children in classrooms or home-based contexts. Students will design and implement an action research project in an effort to meet a goal articulated in an applicable Individualized Education Plan (IEP) or Individualized Family Service Plan (IFSP) or School Improvement Plan (SIP) as the basis of their project.
Prerequisite: Minimum grade of C- in EDHD322, EDHD323, EDSP321, EDSP417, EDHD441, EDHD442, EDHD443, and EDHD444.
Corequisite: EDHD432.

EDHD440 Adult Development (3 Credits)
Major conceptual approaches to the study of adult development including physical, cognitive, social, emotional and self processes that take place within individuals as they progress from emerging adulthood through middle age.
Prerequisite: EDHD320; or permission of EDUC-Human Development and Quantitative Methodology department.
Recommended: EDHD413.

EDHD441 Data Driven Decision Making in EC/ECSE (1 Credit)
Students will be exposed to formative (e.g., classroom based, ongoing) and summative (e.g., standardized testing) assessments. Students will collect and analyze formative assessment data from their internship classrooms as the bases of planning and delivering instruction to meet the diverse needs of all learners. They will also analyze standardized assessment data to gain an understanding of measures used to determined cross-school and cross-teacher effectiveness. Includes Phase I field experience.
Prerequisite: Minimum grade of C- in EDSP423, EDHD431, and EDSP315; and TRACK I: Must have completed EDSP430 and EDSP433 or TRACK 2: Must have completed EDHD415 and EDHD424.
Corequisite: EDHD322, EDHD323, EDSP321, EDSP417, EDHD442, EDHD443, and EDHD444.

EDHD442 Interventions for Children with Behavioral Challenges (1 Credit)
Students will expand knowledge of and develop skills to address challenging behaviors in inclusive early childhood classrooms. Students examine the causes underlying challenging behaviors during the early childhood years, and identify appropriate resources and support services for working with families to develop a unified approach when responding to behavioral challenges. Includes Phase I field experience.
Prerequisite: Minimum grade of C- in EDSP423, EDHD431, and EDSP315; and TRACK I: Must have completed EDSP430 and EDSP 433; or TRACK 2: Must have completed EDHD415 and EDHD 424.
Corequisite: EDSP321, EDSP417, EDHD322, EDHD323, EDHD441, EDHD443, and EDHD444.

EDHD443 Interventions for Children with Social and Communication Challenges (1 Credit)
Students will learn about the characteristics of children with autism spectrum disorder, pervasive developmental disorder, social communication disorder, and other related challenges and will be equipped to meet the needs of this group of children in the early childhood classroom. The utilization of Universal Design for Learning (UDL), Response to Intervention (RTI) and other early childhood special education approaches, as they apply to this specific group of children, will be addressed. Interventions designed to improve the functioning of children with autism spectrum disorders and related disorders will be reviewed. Includes Phase I field experience.
Prerequisite: Minimum grade of C- in EDSP423, EDHD431, and EDSP315; and TRACK I: Must have completed EDSP430 and EDSP 433; or TRACK 2: Must have completed EDHD415 and EDHD 424.
Corequisite: EDHD322, EDSP321, EDSP417, EDHD323, EDHD441, EDHD442, and EDHD444.

EDHD444 Action Research in EC/ECSE (1 Credit)
Students will become familiar with the EC/ECSE research process, literature and how teachers use action research to improve pedagogy and the experiences of children in classrooms or home-based contexts. Students will utilize this knowledge, as well as either a goal in an Individualized Education Plan (IEP) or Individualized Family Service Plan (IFSP) or School Improvement Plan (SIP), to develop an action research study commenced during the following semester. Includes Phase I field experience.
Prerequisite: Minimum grade of C- in EDSP423, EDHD431, and EDSP315; and track 1: Must have completed EDSP430 and EDSP433; OR Track 2: Must have completed EDHD415 and EDHD424.
Corequisite: EDHD322, EDHD323, EDHD441, EDHD442, EDHD443, EDSP417, and EDSP321.

EDHD445 Guidance of Young Children (3 Credits)
Practical aspects for helping and working with children, drawing on research, clinical studies, and observation. Implications for day care and other public issues.
Prerequisite: PSYC100; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD460 Educational Psychology (3 Credits)
Application of psychology to learning processes and theories. Individual differences, measurement, motivation, emotions, intelligence, attitudes, problem solving, thinking and communicating in educational settings.
Prerequisite: PSYC100; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD489 Field Experiences in Human Development (3-6 Credits)
Planned field experience (internship or research-based activities) related to Human Development. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 6 credits.

EDHD498 Special Problems in Education (1-3 Credits)
Available only to students who have definite plans for individual study of approved problems.
Prerequisite: Available only to students who have definite plans for individual study of approved problems.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDHD499 Workshops, Clinics, and Institutes (1-6 Credits)
The following types of educational enterprise may be scheduled under this course heading: workshops conducted by the College of Education (or developed cooperatively with other colleges and universities) and not otherwise covered in the present course listing; clinical experiences in pupil-testing centers, reading clinics, speech therapy laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups such as school superintendents, principals and supervisors.
Repeatable to: 6 credits.

EDHD600 Introduction to Human Development and Child Study (3 Credits)
An overview of the multidisciplinary, scientific principles which describe human development and behavior and an application of these principles in an analysis of a behavioral record. Techniques of observation, recording, and analysis of human behavior. Emphasis on critiquing and applying research findings.

EDHD601 Biological Bases of Behavior (3 Credits)
Emphasizes that understanding of human life, growth and behavior depends on understanding physical processes. Application throughout is made to brain-behavior relationships and implications for understanding and working with people.
Prerequisite: Must have completed or be concurrently enrolled in EDHD600; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD602 Social Bases of Behavior (3 Credits)
The social forces and expectations that influence behavior from infancy through old age and death. The effects of ethnicity, social learning values, attitudes, historical events and mass media on perception and behavior in societal interactions.

EDHD605 Curriculum in Early Childhood Education (3 Credits)
Curriculum theory, research and practice in educational settings for infants and children to age eight.

EDHD611 Cultural and Contextual Influences on the Young Child (3 Credits)
Theory and research on social and cultural influences in early child development.

EDHD617 Achievement Motivation in Adolescence (3 Credits)
Study of different aspects of motivation and how they develop in the secondary school years. Focus on how different instructional practices influence motivation and design of various strategies for improving students motivation.
Credit Only Granted for: EDHD779W or EDHD617.
Formerly: EDHD779W.

EDHD619 Advanced Scientific Concepts in Human Development (3 Credits)
A critical examination of concepts and issues in contemporary culture as these relate to the development and learning of children and youth.
Repeatable to: 6 credits if content differs.

EDHD624 Cognitive and Motivational Bases of Literacy Instruction in the Content Areas (6 Credits)
Secondary and middle school teachers learn about and apply knowledge and skills related to the cognitive and motivational dimensions of literacy and learning from text for a variety of content areas. Characteristics of learning environments that enable students to engage productively with diverse texts, disciplinary tasks, and technological resources in content areas are identified.
Credit Only Granted for: EDHD624 or EDHD779G.
Formerly: EDHD779G.

EDHD629 Seminar for the Center for Children, Relationships, and Culture (1 Credit)
A seminar and colloquia series featuring speakers from the department, the college, the university, and other universities and institutions from across the world that aims to cover issues pertaining to contemporary theory and research in human development.
Recommended: For graduate students in Human Development.
Repeatable to: 8 credits if content differs.

EDHD635 Adolescents at Risk (3 Credits)
Study of current research on risky behaviors that impact adolescent student learning and achievement particular in underserved populations. General diversity issues and topics specific issues that put adolescents at risk for academic failure and other negative trajectories will be explored.
Recommended: EDHD600.
Credit Only Granted for: EDHD635 or EDHD779L.
Formerly: EDHD779L.

EDHD659 Direct Study of Individuals (3 Credits)
Observational techniques to record the behavior of an individual. Procedures to ensure objectivity in data collection. Methods used to analyze, categorize, quantify observational data in research.

EDHD662 Research Methods in Education Settings (3 Credits)
Research methods associated with studying the development, achievement, and school adjustment of children and adolescents in educational settings, with an emphasis on quantitative methodologies.

EDHD674 Self Processes in Adolescence: Implications for Academic Achievement and School Adjustment (3 Credits)
Study of the development of the self from infancy through adolescence, and examination of the literature on the self processes of special adolescent populations as they relate to achievement-related orientations and school adjustment in secondary settings.
Credit Only Granted for: EDHD619L or EDHD674.
Formerly: EDHD619L.

EDHD690 Theoretical Foundations of Human Development (3 Credits)
Theoretical foundations in the field of human development with a focus on connections between the major theoretical paradigms in the literature and current research in developmental science.

EDHD692 Cognitive Basis of Instruction (3 Credits)
Psychological and educational research literature on human cognition, especially as applied to learning and teaching in classroom settings.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDHD700 Infant Development (3 Credits)
An examination of recent research findings in physical, social, emotional and language development during infancy. A review of prenatal and perinatal factors in relation to their influence on later development.

EDHD703 Source Selection, Multimedia, & Misinformation: How Students Learn to Navigate Evidence in the 21st Century (3 Credits)
Explores how students come to understand how evidence is acquired, produced, and used to make inferences and draw conclusions about the world. Topics will include selective trust, source selection, navigating multiple mediums and modalities, epistemic cognition, scientific reasoning, motivated cognition, and confirmation bias. We will explore both basic research on these topics as well as ways in which this research can be used to foster critical thinking and scientific literacy in childhood and beyond, in both formal and informal educational settings.

EDHD711 Peer-Culture and Group Processes in Human Development (3 Credits)
The process of group formation, role-taking and status-winning, and the emergence of the peer-culture during childhood and the evolution of the child society at different maturity levels to adulthood. The developmental tasks and adjustment problems associated with winning, belonging, and playing roles in the peer group.
Prerequisite: Permission of EDUC-Human Development and Quantitative Methodology department.

EDHD718 Apprenticeship in College Teaching (1 Credit)
For graduate students teaching autonomously for the first, second, or third tiem at the University of Maryland, College Park; not intended for teaching assistants. This course provides graduate student teachers with a set of structured experiences that foster professional growth and development in the role of college instructor. Includes seminars on the scholarship of college teaching and principles of optimal college classroom environments, peer and faculty in-class observations of teaching, and guided reflective analysis of experience in the classroom.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDHD720 Social Development and Socialization Processes (3 Credits)
This course covers social development and socialization processes across the life-span. The course typically covers the following topics: parent-child relationships, peer relationships, moral development, social cognition, social competence, social motivation, self-regulation, and cultural influences on development. This is core doctoral course.

EDHD721 Cognitive Development and Learning: An Introduction (3 Credits)
Introductory survey into contemporary theory and research in cognitive development; applications to classroom learning.

EDHD722 Learning Theory and the Educative Process (3 Credits)
Advanced study of theories, issues and research in several categories of cognition and learning applied to education and the helping professions.
Prerequisite: EDHD721; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD750 Culture, Context, and Development (3 Credits)
This course will cover theory and research on cultural and contextual influences on social development.

EDHD751 Child Development and Poverty (3 Credits)
This course examines the theoretical, methodological, and empirical literature on the effects of poverty on children's development from a multidisciplinary perspective. It includes basic concepts in methodology, measurement design, and issues related to connecting basic research on poverty and children to policy and program interventions.
Prerequisite: EDHD720; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD760 Advanced Educational Psychology (3 Credits)
Appplication of psychology to learning processes and theories. Individual differences, measurement, motivation, and intelligence.
Prerequisite: Prior course in educational psychology, learning, or cognition; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD768 Laboratory Methods in Developmental Psychophysiology (3 Credits)
Covers basic electrophysiology and human electrophysiology. Topics include recording, processing, and analyzing EEG and ERP. Emphasis will be placed on the testing of infant and child populations.
Recommended: EDHD775.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

EDHD775 Human Development and Neuroscience (3 Credits)
Course focuses on the biological bases of human behavior including physiological processes which have an impact on human development.
Prerequisite: EDHD601; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD779 Selected Topics in Human Development (1-6 Credits)
This course focuses on topics of current significance in human development research. Topics covered change each semester, and vary by instructor.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 6 credits if content differs.

EDHD780 Research Methods in Human Development (3 Credits)
Research methodology for studying human development: research design, hypothesis formulation, instrument development, methodological and statistical approaches, survey of methodologies.
Prerequisite: EDMS651; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD789 Internship in Human Development (3-8 Credits)
Internship experience in one or more human service agencies in the community.
Prerequisite: 9 credits in EDHD courses.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 9 credits.

EDHD798 Laboratory in Human Development (1-6 Credits)
Independent research supervised by an instructor in a research setting.
Repeatable to: 9 credits if content differs.

EDHD799 Master's Thesis Research (1-6 Credits)
Registration required to the extent of six hours for master's thesis.

EDHD800 Seminar in Early Childhood Education (3 Credits)
This seminar explores relevant current issues in early childhood development and education.

EDHD820 Advanced Topics in Social Development (3 Credits)
Advanced doctoral seminar on socialization and social development with consideration of selected topics. Identification of research problems and areas of application.
Prerequisite: EDHD720; or permission of EDUC-Human Development and Quantitative Methodology department.
Credit Only Granted for: EDHD820 or EDHD821.
Formerly: EDHD821.

EDHD835 The Development of Achievement Motivation (3 Credits)
Development of achievement motivation and how it relates to academic achievement during the elementary and secondary school years. Expectancy-value theory, attribution theory, self-efficacy theory, socialization of achievement motivation.
Prerequisite: EDHD830 or EDHD721; or permission of EDUC-Human Development and Quantitative Methodology department.

EDHD840 Language and Literacy Development (3 Credits)
Content of this course is current theoretical and empirical research on children's language developments and on the linguistic basis of beginning reading.

EDHD842 Learning in Context (3 Credits)
Educational and home context that influence development of motivation, cognitive strategies, and knowledge will be explored.
Prerequisite: EDHD721.

EDHD850 Social Cognition and Moral Reasoning (3 Credits)
Theory and research on social-cognition development and moral development, from infancy to adolescence will be covered.

EDHD872 Young Children at Environmental Risk: Developmental and Intervention Issues (3 Credits)
Examination of impact of poverty on young children, their families, and communities. Epidemiological, physiological, and sociological studies will be reviewed.

EDHD875 Advanced Human Development and Neuroscience (3 Credits)
Advanced doctoral seminar in the biological bases of behavior. Identification of research problems and areas of application.
Prerequisite: EDHD775; or permission of EDUC-Human Development and Quantitative Methodology department.
Credit Only Granted for: EDHD811 or EDHD875.
Formerly: EDHD811.

EDHD878 Applied Research and Strategies (3 Credits)
Examine current human development research literature, define a research problem and design and implement a research study or review in collaboration with faculty.
Prerequisite: EDMS651; or permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 6 credits if content differs.

EDHD888 Apprenticeship in Human Development Research (1-8 Credits)
Apprenticeship in Human Development research.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDHD889 Practicum in Human Development (3-9 Credits)
Field experience in applied human development at a professional level of competence in a particular role with appropriate supervision.
Prerequisite: Credit not to be granted for experience accrued prior to registration; and open only to degree and certificate-seeking graduate students.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 9 credits if content differs.

EDHD898 Pre-Candidacy Research (1-8 Credits)

EDHD899 Doctoral Dissertation Research (1-8 Credits)
Registration required to 12-18 hours for a Ph.D. dissertation.

EDHI - Education Leadership, Higher Ed and International Ed

EDHI488 Special Topics in Education Policy and Administration (1-3 Credits)
Special and intensive treatment of current topics and issues in education policy and administration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Repeatable to: 6 credits.
Formerly: EDPL488.

EDHI489 Field Experiences in Education (1-4 Credits)
Planned field experience in education-related activities. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Formerly: EDPL489.

EDHI498 Special Problems in Education (1-3 Credits)
Available only to students who have definite plans for individual study of approved problems.
Prerequisite: Available only to students who have definite plans for individual study of approved problems.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Formerly: EDPL498.

EDHI499 Workshops, Clinics, and Institutes (1-6 Credits)
The following type of educational enterprise may be scheduled under this course heading: Workshops conducted by the College of Education (or developed cooperatively with other colleges and universities) and not otherwise covered in the present course listing; clinical experiences in pupil-testing centers, reading clinics, speech therapy laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups such as school superintendents, principals, and supervisors.
Repeatable to: 6 credits.
Formerly: EDPA499.

EDHI600 Education and Society (3 Credits)
Education and Society is an introductory course to graduate studies in the Department of Education Policy and Leadership. Students consider how social institutions influence -- and in turn are influenced by -- education policies and practices.
Credit Only Granted for: EDHI600, EDPL600, or EDPS600.
Formerly: EDPL600.

EDHI605 Comparative Education (3 Credits)
Analyzes and compares leading issues in education in various countries of the world, particularly as they relate to crucial problems in American education.
Credit Only Granted for: EDHI605, EDPL605, or EDPS605.
Formerly: EDPL605.

EDHI606 Political Economy of Education in a Global Context (3 Credits)
Examination of alternative economics perspectives and their implications for education policy and practice internationally, from local to global levels. The connection of education to issues of development, inequality, poverty, gender, and race will be discussed.
Credit Only Granted for: EDHI606, EDPL606, or EDPS606.
Formerly: EDPL606.

EDHI607 Culture and Education in a Global Context (3 Credits)
Examines cultural theories and analyzes cultural influences in education. Course materials and discussion critically analyze cultural transmission and schooling practices. Also examined are politics of culture, multiculturalism, global cultural clashes, and educators as critical culture workers.
Credit Only Granted for: EDHI607, EDPL607, or EDPS607.
Formerly: EDPL607.

EDHI608 Gender and Education (3 Credits)
The course examines feminist theories on gender inequity, and analyzes social impacts on girls' and women's education. Also examined are women's ways of knowing, issues of race and class, gender and development, ecofeminism, and technology for women.
Credit Only Granted for: EDPL788B or EDPL608.
Formerly: EDPL608.

EDHI630 Analyzing Systemwide Education Policy (3 Credits)
Analysis of how assessments are made of systemwide education policy based on the approaches used in studies of national education policy by international agencies.
Credit Only Granted for: EDHI630, EDPL630, or EDPS630.
Formerly: EDPL630.

EDHI642 Management of Change in Educational Organizations (3 Credits)
Role of individual as a change agent; issues related to effecting change within organizational sub-systems and total systems are considered. Specific strategies for successful change in schools are addressed.
Credit Only Granted for: EDHI642, EDPL642, or EDPS642.
Formerly: EDPL642.

EDHI643 Management of Human Resources In Education (3 Credits)
Examination of knowledge and development of awareness and capabilities needed by educational leaders to promote student success by managing school system personnel needs. Emphasis on recruitment, selection and supervision as well as labor relations and collective bargaining.
Credit Only Granted for: EDHI643, EDPL643, or EDPS643.
Formerly: EDPL643.

EDHI650 Professional Seminar in Higher and Adult Education (3 Credits)
Introduction to higher and adult education as a field of study. Origins, current dimensions and problems, and emerging issues. Field trips to state and national capitols, and involvement in professional conferences.
Credit Only Granted for: EDHI650, EDPL650, or EDPS650.
Formerly: EDPL650.

EDHI652 Higher Education in American Society (3 Credits)
Examines the concepts of academic freedom, corporate autonomy and institutional accountability with emphasis on twentieth century relationships between higher education and government in the United States.
Credit Only Granted for: EDHI652, EDPL652, or EDPS652.
Formerly: EDPL652.

EDHI653 Organization and Administration of Higher Education (3 Credits)
Basic concepts and terminology related to organizational behavior and institutional governance structures. The governance and organization of higher education in the United States.
Credit Only Granted for: EDHI653, EDPL653, or EDPS653.
Formerly: EDPL653.

EDHI654 The Community and Junior College (3 Credits)
Historical development and philosophical foundations of community and junior colleges in America with emphasis on organizational and administrative structures in two year institutions and the clientele they serve.
Credit Only Granted for: EDHI654, EDPL654, or EDPS654.
Formerly: EDPL654.

EDHI657 History of Higher Education in the United States (3 Credits)
History of higher education in America from colonial times to the present with emphasis on expansion of higher education and the growing complexity of its structures, organization, and purposes.
Credit Only Granted for: EDHI657, EDPL657, or EDPS657.
Formerly: EDPL657.

EDHI660 Retention Theories and the Impact of College (3 Credits)
An introduction to retention theories an the college impact literature. The primary focus will be to examine the disciplinary and philosophical frameworks that have informed the development of leading theories and policies.
Credit Only Granted for: EDHI660, EDPL660, or EDPS660.
Formerly: EDPL660.

EDHI662 Research on Ethnic Minorities and Demographic Trends in Higher Education (3 Credits)
Current research on ethnic minority student populations including issues of access, campus climate, racial identity, achievement and motivation. In addition to student issues, course examines issues for faculty of color in higher education, curriculum and teaching, and leadership and governance. The application of broad demographic changes in the nation and their impact on higher education over time.
Credit Only Granted for: EDHI662, EDPL662, or EDPS662.
Formerly: EDPL662.

EDHI663 Philanthropy and Fundraising in Higher Education (3 Credits)
A critical look at how philanthropy and fundraising has affected American Higher Education. Topics will include: a history and overview of philanthropy, motivations of and traditions of giving in different populations, ethics, and critical issues within educational and advancement.
Credit Only Granted for: EDHI663 or EDHI788D.
Formerly: EDHI788D.

EDHI664 The College Experience (3 Credits)
Designed to provide students with an overview of the research and scholarship on two of the major stakeholders in higher education -- students and faculty. Examines the educational experiences of college students in and out of the classroom in higher education in the United States by focusing on what students learn and the different collegiate experiences that influence their learning.
Credit Only Granted for: EDHI664, EDPL664, or EDPS664.
Formerly: EDPL664.

EDHI665 College Access and Choice (3 Credits)
Examines the college-going process, how and why some students successfully navigate it, and what policies and programs can help students from disadvantaged or underrepresented backgrounds overcome barriers to college access and entry.
Credit Only Granted for: EDHI665 or EDHI788L.
Formerly: EDHI788L.

EDHI666 The Academic Profession (3 Credits)
Explores how faculty demographics, discipline, graduate socialization, and organizational context (institutional type, mission, and culture) matter to critical higher edcuation outcomes, such as student learning, community engagement, research, shared governance and access and equity.
Credit Only Granted for: EDHI666 or EDHI788P.
Formerly: EDHI788P.

EDHI667 Women in Higher Education (3 Credits)
A comprehensive overview of the history, present condition, and current research on women students, faculty, adminstrators, and staff in higher education. Explores why and how women and men experience higher educaton differently, by drawing on historical, cultural, and psychological contexts, feminist theoretical and research perspectrives and recent research in various disciplines.
Credit Only Granted for: EDHI667 or EDHI788A.
Formerly: EDHI788A.

EDHI672 Modes of Inquiry in Education Research (3 Credits)
Introduction to modes of inquiry appropriate to research on issues and problems in education. Examination of qualitative, quantitative and mixed research methods and designs with a focus on related standards of quality.
Credit Only Granted for: EDHI672, EDPL672, or EDPS672.
Formerly: EDPL672.

EDHI673 Economic Evaluation of Education (3 Credits)
Examination and application of economic approaches - cost, cost-effectiveness, and cost-benefit analysis - to the evaluation of education programs and policies.
Credit Only Granted for: EDHI673, EDPL673, or EDPS673.
Formerly: EDPL673.

EDHI674 Minority Serving Institutions (3 Credits)
Definitions and designations of Minority Serving Institutions vary; however they traditionally include Historically Black Colleges and Universities, Hispanic-Serving Institutions, and Tribal Colleges and Universities. Exploring these institutions as well as some non-traditional MSIs including, Deaf Serving Institutions and Asian American and Pacific Islander Serving Institutions.
Credit Only Granted for: EDHI674 or EDHI788Q.
Formerly: EDHI788Q.

EDHI677 Ranking System in Higher Education: How They Work and Why They Matter (3 Credits)
A critical examination of domestic and international university rankings systems from their historic origins to current day. Students explore the criteria used to identify quality, the methods used to collect data, and the impact of ranking systems on institutional decision-making.
Credit Only Granted for: EDHI677 or EDHI788W.
Formerly: EDHI788W.

EDHI679 Master's Seminar (3 Credits)
Directed study for master's degree students writing seminar papers.
Formerly: EDPL679.

EDHI680 Gender, Development, and Education (3 Credits)
Focusing on gender as an analytical frame and a discrete variable, a comprehensive view of the relationship between gender and education in the context of national development is presented. It identifies the conditions of men and women's education and policy efforts to promote equity and social transformation.
Credit Only Granted for: EDHI674, EDHI680 or EDHI788K.
Formerly: EDHI788K.

EDHI681 Education for Global Peace (3 Credits)
This course will examine how education can address the threats of violence and wars. It prepares students to teach about peace, nonviolence, and conflict resolution, and also to analyze and implement changes in school and society to contribute to peace and non-violence.
Credit Only Granted for: EDHI681, EDPL681, or EDPS681.
Formerly: EDPL681.

EDHI682 Ecological Ethics and Education (3 Credits)
An exploration of the paradigms, approaches, and ways of knowing offered through ecological ethics and environmental sustainability education.
Credit Only Granted for: EDHI682 or EDHI788E.
Formerly: EDHI788E.

EDHI683 World Religions and Their Implications for Education (3 Credits)
Students develop a basic understanding of world religions, looking at their orgins, development, teachings, and primary figures. Students explore the roles, meaning, purpose that education plays in the various religions and examine their implications for education in the 21st century.
Credit Only Granted for: EDHI683 or EDHI788C.
Formerly: EDHI788C.

EDHI684 Alternative Education, Alternative Development (3 Credits)
A critical examination of the political economy of education and international development policies and practices. Focus is on the implications of these critiques for alternative education and development policies and practices.
Recommended: EDHI606.
Credit Only Granted for: EDHI684 or EDHI788D.
Formerly: EDHI788D.

EDHI689 Practicum In Educational Administration and Supervision (1-3 Credits)
Promotes skill development in managerial, leadership and supervisory areas. Practicum is based on results of diagnostic instruments and an individual professional development plan.
Repeatable to: 3 credits if content differs.
Formerly: EDPL689.

EDHI700 Qualitative Research Methods in Education (3 Credits)
Qualitative methods in education research, emphasizing the paradigms of philosophy, history, sociology, anthropology, and comparative studies as they rely on narrative rather than quantitative ordering of data.
Credit Only Granted for: EDHI700, EDPL700, or EDPS700.
Formerly: EDPL700.

EDHI704 Issues and Institutions in International Educational Development (3 Credits)
Examines the role of educational institutions in international development and the issues involved in educational planning and policymaking at the local, national and international levels.
Credit Only Granted for: EDHI704, EDPL704, or EDPS704.
Formerly: EDPL704.

EDHI710 Globalization and Education (3 Credits)
Multiple education policies, practices, and innovations linked to economic, technological, and cultural dimensions of globalization are affecting education systems. The consequences of such forces on educational equality, equity, and quality, noting similarities and differences between industrialized and developing countries will be explored.
Recommended: EDHI605.
Credit Only Granted for: EDHI710 or EDHI788J.
Formerly: EDHI788J.

EDHI713 Non-Formal Education (3 Credits)
An examination of forms of education outside the formal education system--known generally as nonformal (NFE) education and including popular education--to identify how these forms can assist marginalized populations in both Third World and industrialized countries to improve their quality of life and undertake collective action for social advancement.
Recommended: EDHI605.
Credit Only Granted for: EDHI707, EDHI713 or EDHI788N.
Formerly: EDHI788N.

EDHI725 Education in East Asia (3 Credits)
The course traces the cultural and intellectual history of education in East Asia, and examine features and important issues in East Asian education systems. School reform and social changes are studied.
Credit Only Granted for: EDHI725, EDPL725, or EDPS725.
Formerly: EDPL725.

EDHI743 Leadership Theory (3 Credits)
Critical analysis of contemporary leadership theoretical constructs. Consideration of implications for organizational improvement.
Prerequisite: EDHI642.
Credit Only Granted for: EDHI743, EDPL743, or EDPS743.
Formerly: EDPL743.

EDHI744 Organizational Theory in Research and Practice (3 Credits)
This course provides an overview of the study of organizations for graduate students interested in education and social policy. Class lectures focus on contrasting theories and critiquing application of theories to social policy problems with an emphasis on education. Case materials focus on a variety of organizational areas including: schools, hospitals, non-profit community based organizations, the arts, elected bodies, higher education and private business.
Credit Only Granted for: EDHI744, EDPL744, or EDPS744.
Formerly: EDPL744.

EDHI750 International Higher Education (3 Credits)
Comparison of higher education systems in several countries, and of the problems and issues in higher education faced by these countries.
Credit Only Granted for: EDHI750, EDPL750, or EDPS750.
Formerly: EDPL750.

EDHI752 State Systems of Higher Education (3 Credits)
Creation, operation, alteration and evaluation of state systems of higher education. Campus autonomy versus public accountability. Analysis of topics such as state planning, budget and program review, and administration of student aid and federal programs.
Credit Only Granted for: EDHI752, EDPL752, or EDPS752.
Formerly: EDPL752.

EDHI754 Higher Education Finance (3 Credits)
Economic perspectives on higher education. Ways of financing higher education and current finance issues. Higher education budget concepts and processes.
Credit Only Granted for: EDHI754, EDPL754, or EDPS754.
Formerly: EDPL754.

EDHI755 Federal Policies in Post-Secondary Education (3 Credits)
Evolution of the federal role, its current scope and funding. Policy issues associated with federal student aid programs, research grants and social equity regulations.Cross-listed with EDPS755.
Credit Only Granted for: EDHI755, EDPL755, or EDPS755.
Formerly: EDPL755.

EDHI759 Seminar in Adult and Continuing Education (3 Credits)
Current issues and problems in adult and continuing education and lifelong learning in America.
Formerly: EDPL759.

EDHI788 Special Topics in Education Policy and Administration (1-3 Credits)
Special and intensive treatment of current topics and issues in education policy and administration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Repeatable to: 6 credits.

EDHI789 Doctoral Practicum in Administration and Supervision (1-3 Credits)
Experiential activities designed to enhance student skills. Based on Individual Professional Development Plan for each student.
Repeatable to: 3 credits if content differs.
Formerly: EDPL789.

EDHI798 Special Problems in Education (1-6 Credits)
Master's, AGS, or doctoral candidates who desire to pursue special research problems under the direction of their advisors may register for credit under this number.
Formerly: EDPL798.

EDHI799 Master's Thesis Research (1-6 Credits)
Formerly: EDPL799.

EDHI805 Seminar in Comparative Education (3 Credits)
Analysis of educational issues on a worldwide basis with opportunities to focus on a particular country on an individual basis. Analysis of qualitative research methods as used in cross-cultural and comparative education studies.
Credit Only Granted for: EDHI805, EDPL805, or EDPS805.
Formerly: EDPL805.

EDHI839 Seminar in Teacher Education (3-6 Credits)
A problem seminar in teacher education.
Repeatable to: 6 credits.
Formerly: EDPL839.

EDHI853 Leadership in Higher Education (3 Credits)
Theories of organizational leadership applied to institutions of higher education.
Prerequisite: EDHI653.
Credit Only Granted for: EDHI853, EDPL853, or EDPS853.
Formerly: EDPL853.

EDHI855 Lifelong Learning Policy (3 Credits)
Policies and programs for training and continued learning in business and industry, government agencies, unions, professional societies, and nonprofit organizations.
Credit Only Granted for: EDHI855, EDPL855, or EDPS855.
Formerly: EDPL855.

EDHI862 Seminar: Theoretical Basis of Administrative Behavior (3 Credits)
Study of administrative behavior in educational institutions. Development of a research design for the study of administrative behavior in one educational institution.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDHI862, EDPL862, or EDPS862.
Formerly: EDPL862.

EDHI888 Apprenticeship in Education (1-8 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate-seeking graduate students.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Formerly: EDPL888.

EDHI889 Internship in Education (3-8 Credits)
Internship experiences at a professional level of competence in a particular role with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Formerly: EDPL889.

EDHI895 Research Critique Seminar (3 Credits)
Critiques of research designs in preparation for the doctoral dissertation.
Credit Only Granted for: EDHI895, EDPL895, or EDPS895.
Formerly: EDPL895.

EDHI898 Pre-Candidacy Research (1-8 Credits)
Formerly: EDPL898.

EDHI899 Doctoral Dissertation Research (1-8 Credits)
Registration required to the extent of 6-9 hours for an Ed.D. Project and 12-18 hours for a Ph.D. Dissertation.
Formerly: EDPL899.

EDMS - Measurement, Statistics, and Evaluation

EDMS410 Classroom Assessment (3 Credits)
Developing and using classroom assessments, including tests, performance assessments, rating scales, portfolios, observations and oral interactions; basic psychometric statistics; standard setting; grading; communicating assessment information; testing ethics; locating and evaluating measures; program evaluation and classroom research; assessments used for educational policy decisions.
Restriction: Junior standing or higher.

EDMS451 Introduction to Educational Statistics (3 Credits)
Introduction to statistical reasoning; location and dispersion measures; computer applications; regression and correlation; formation of hypotheses tests; t-test; one-way analysis of variance; analysis of contingency tables.
Restriction: Sophomore standing or higher.
Credit Only Granted for: BIOM301, BMGT230, CCJS200, ECON230, EDMS451, GEOG306, GEOL351, GVPT422, INST314, JOUR405, PSYC200 or SOCY201.

EDMS489 Field Experiences in Measurement and Statistics (1-4 Credits)
Planned field experience in education-related activities. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 4 credits.

EDMS498 Special Problems in Measurement and Statistics (1-3 Credits)
Available only to education majors who have formal plans for individual study of approved problems.
Prerequisite: Available only to education majors who have formal plans for individual study of approved problems.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 6 credits.

EDMS610 Classroom Assessment and Evaluation (3 Credits)
Develop the understandings and skills needed to validly, reliably, and accurately assess student learning and to provide focused leadership in the area of classroom assessment.

EDMS622 Theory and Practice of Standardized Testing (3 Credits)
Principles of interpretation and evaluation of aptitude, achievement, and personal-social instruments; theory of reliability and validity; prediction and classification; norm- and criterion-referenced testing concepts.
Prerequisite: EDMS451; or EDMS645.

EDMS623 Applied Measurement: Issues and Practices (3 Credits)
Measurement theory and its application at an intermediate level; test development, validation and interpretation; issues and recent developments in measurement.
Prerequisite: EDMS410. And EDMS645; or students who have taken courses with comparable content may contact the department.

EDMS626 Instrumentation (3 Credits)
Theory, development, and applications of various affective, cognitive, or behavioral measurement instruments and procedures, including questionnaire and test items, observational protocols, and cutting-edge innovative game and scenario-based assessments.
Prerequisite: EDMS623.

EDMS645 Quantitative Research Methods I (3 Credits)
Research design and statistical applications in educational research: data representation; descriptive statistics; estimation and hypothesis testing. Application of statistical computer packages is emphasized.

EDMS646 General Linear Models I (3 Credits)
A first post-introductory inferential statistics course, with emphasis on analysis of variance procedures and designs from within the general linear modeling framework. Assignments include student analysis of education and related data; application of statistical software packages is emphasized.
Prerequisite: EDMS645; or an equivalent introductory statistics course.

EDMS647 Causal Inference and Evaluation Methods (3 Credits)
Counterfactual (potential outcomes) framework for causal inference, design/analysis strategies for confounder control, and specific best-practice applications to the evaluation of programs.
Prerequisite: Must have completed or be concurrently enrolled in EDMS651.

EDMS651 General Linear Models II (3 Credits)
Multiple regression and correlation analysis; trend analysis; hierarchical and stepwise procedures; logistic regression; software for regression analysis.
Prerequisite: EDMS646; or students who have taken courses with comparable content may contact the department.

EDMS655 Introduction to Multilevel Modeling (3 Credits)
Introduction to multilevel models and methodology as strategies for modeling change and organizational effects.
Prerequisite: EDMS651; or students who have taken courses with comparable content may contact the department.

EDMS657 Exploratory Latent and Composite Variable Methods (3 Credits)
Development of models for exploratory factor analysis and their practical applications. Additional topics will draw from latent class analysis, cluster analysis, mixture models, canonical correlation, multidimensional scaling, and configural frequency analysis.
Prerequisite: EDMS651.

EDMS665 Data Analysis and Statistical Consulting (3 Credits)
Advanced data analysis procedures applied to real-world clients' problems arising in a wide variety of substantive research settings within and beyond education.
Prerequisite: EDMS651; or students who have taken courses with comparable content may contact the department.

EDMS722 Structural Modeling (3 Credits)
Statistical theory and methods of estimation used in structural modeling; computer program applications; multisample models; mean structture models; structural models with multilevel data (e.g., sampling weights, growth models, multilevel latent variable models).
Prerequisite: EDMS657.

EDMS724 Modern Measurement Theory (3 Credits)
Theoretical formulations of measurement from a latent trait theory perspective.
Prerequisite: EDMS623 and EDMS651.

EDMS738 Seminar in Special Problems in Measurement (1-3 Credits)
An opportunity for students with special interests to focus in depth on contemporary topics in measurement. Topics to be announced, but will typically be related to applied and theoretical measurement.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 3 credits.

EDMS747 Design of Program Evaluations (3 Credits)
Analysis of measurement and design problems in program evaluations.
Prerequisite: EDMS626, EDMS651, and EDMS647. Or permission of instructor; and permission of EDUC-Human Development and Quantitative Methodology department.

EDMS769 Special Topics in Applied Statistics in Education (1-4 Credits)
Designed primarily for students majoring or minoring in measurement, statistics or evaluation.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDMS771 Multivariate Data Analysis (3 Credits)
Principal components, canonical correlation, discriminant functions, multivariate analysis of variance/covariance and other multivariate techniques.
Prerequisite: EDMS651.

EDMS779 Seminar in Applied Statistics (1-3 Credits)
Enrollment restricted to students with a major or minor in measurement, statistics or evaluation. Seminar topics will be chosen by individual student interest.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department. And must be in Measurement, Statistics and Evaluation (Master's) program; or must be in Measurement, Statistics and Evaluation (Doctoral) program.
Repeatable to: 3 credits if content differs.

EDMS787 Bayesian Inference and Analysis (3 Credits)
Models and model fitting methods commonly used in Bayesian Inference, such as Markov Chain Monte Carlo methods (e.g., Gibbs, Metropolis Sampling), with applications within and beyond the social and behavioral sciences. Analytical and philosophical differences between Frequentist and Bayesian statistics will also be highlighted.
Prerequisite: EDMS779 or permission of the instructor.
Credit Only Granted for: EDMS769B or EDMS787.
Formerly: EDMS769B.

EDMS798 Special Problems in Education (1-6 Credits)
Master's, EDMS majors, or doctoral candidates who desire to pursue special research problems under the direction of their advisors may register for credit under this number.
Restriction: Must be in Measurement, Statistics and Evaluation (Master's) program; or must be in Measurement, Statistics and Evaluation (Doctoral) program.

EDMS799 Master's Thesis Research (1-6 Credits)
Registration required to the extent of 6 credits.
Restriction: Must be in a major within the EDUC-Human Development and Quantitative Methodology department.

EDMS879 Doctoral Seminar (1-3 Credits)
Seminar that supports analysis of doctoral projects and theses, and of other on-going research projects.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDMS889 Internship in Measurement and Statistics (3-12 Credits)
Provides internship experiences at a professional level of competence in a particular role with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Prerequisite: Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.

EDMS898 Pre-Candidacy Research (1-8 Credits)

EDMS899 Doctoral Dissertation Research (1-8 Credits)
Registration required to the extent of 12 credits.

EDPS - Education Policy Studies

EDPS401 Educational Policy, and Social Change (3 Credits)
An examination of education policy in relation to the social environment and change. Contemporary education and social issues are examined, including technology as a complex force which influences social change. This is a Social Foundations course.
Credit Only Granted for: EDPL401 or EDPS401.
Formerly: EDPL401.

EDPS610 History of Western Education (3 Credits)
Educational institutions through the ancient, medieval and early modern periods in western civilization, as seen against a background of socio-economic development.
Credit Only Granted for: EDHI610, EDPL610, or EDPS610.
Formerly: EDPL610.

EDPS623 Education Policy and Theories of Change (3 Credits)
The work of change theorists in history, economics, political science, philosophy, sociology and anthropology as it impinges upon education policy.
Credit Only Granted for: EDHI623, EDPL623, or EDPS623.
Formerly: EDPL623.

EDPS626 Educatin Policy and the Young (3 Credits)
The systematic exploration of education policy as it has organized, reflected and influenced the lives of children, youth, and families, with particular emphasis on American policies and systems.
Credit Only Granted for: EDHI626, EDPL626, or EDPS626.
Formerly: EDPL626.

EDPS636 Communication and the School Curriculum (3 Credits)
Curriculum development based on communication as the major vehicle for describing the learner's interactions with persons, knowledge, and materials in the classroom and school environment.
Credit Only Granted for: EDHI636, EDPL636, or EDPS636.
Formerly: EDPL636.

EDPS663 Policy Formulation in Education (3-6 Credits)
Various levels of school governance. Analysis of policy formation, administration and evaluation issues.
Restriction: Permission of EDUC-Teaching, Learning, Policy and Leadership department.
Credit Only Granted for: EDHI663, EDPL663, or EDPS663.
Formerly: EDPL663.

EDPS712 Analysis of Educational Concepts (3 Credits)
Analyses of selected concepts used in thinking about education.
Credit Only Granted for: EDHI712, EDPL712, or EDPS712.
Formerly: EDPL712.

EDPS811 Seminar in History of Education (3 Credits)
Examination of current developments and continuing controversies in the field of history of education. The analysis of the various ways in which history of education is approached methodologically and interpretatively.
Credit Only Granted for: EDHI811, EDPL811, or EDPS811.
Formerly: EDPL811.

EDPS812 Seminar in Philosophy of Education (3 Credits)
Examination of current developments and continuing controversies in the field of philosophy of education. The function of educational philosophy, methodological approaches, and current research trends.
Credit Only Granted for: EDHI812, EDPL812, or EDPS812.
Formerly: EDPL812.

EDPS813 Seminar in Educational Sociology (3 Credits)
Sociological analysis of educational processes and institutions; emphasis on the social effects of formal organizations.
Credit Only Granted for: EDHI813, EDPL813, or EDPS813.
Formerly: EDPL813.

EDSP - Education, Special

EDSP400 Instruction of Students with Severe Disabilities I (3 Credits)
Functional assessment procedures and instructional methods for students with severe disabilities.
Restriction: Must be in Special Education program. Jointly offered with EDSP602.
Credit Only Granted for: EDSP400 or EDSP602.

EDSP401 Teaching Students with Disabilities in Elementary Classrooms (3 Credits)
This course is designed for elementary education majors to prepare for teaching students with disabilities in elementary classrooms. The course examines the legal requirements for general education teachers in the public schools including best practices for participating in the Individual Education Program (IEP) team process, and understanding Response to Intervention (RTI) as a approach to the early identification and support of students with learning and behavior needs. Information is provided on the characteristics of students who have been identified as having high incidence disabilities (e.g., learning disabilities, attention deficit hyperactivity disorder, speech and language delays, emotional or behavioral disorders, and other health impairments). The course then provides information on universal design (UDL) principles for learning, instructional suggestions to include students with disabilities in the general classroom, co-teaching and methods for integrating technology and assistive technology to benefit all students.
Restriction: Permission of EDUC-Special Education department.
Credit Only Granted for: EDSP401 or EDSP499F.
Formerly: EDSP499F.

EDSP402 Field Placement: Severe Disabilities I (2-5 Credits)
Practicum experience in settings serving students with severe disabilities.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP403 Instruction of Students with Physical Disabilities (3 Credits)
Assessment, curriculum, and instruction for students with physical disabilities. Focus on etiology, environmental and learning adaptations, and assistive technology.
Prerequisite: EDSP400 or EDSP602. Jointly offered with EDSP603.
Credit Only Granted for: EDSP403 or EDSP603.

EDSP404 Education of Students with Autism Spectrum Disorders (3 Credits)
Characteristics, needs, assessment, and educational methods for students with autism spectrum disorders.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department. Jointly offered with EDSP604. Credit onl y granted for: EDSP404 or EDSP604.

EDSP410 Instruction of Students with Severe Disabilities II (3 Credits)
Functional assessment, curriculum, and instruction related to academic and community functioning skills for students with severe disabilities.
Restriction: Must be in Special Education program. Jointly offered with EDSP614.
Credit Only Granted for: EDSP410 or EDSP614.

EDSP411 Universal Design for Learning (3 Credits)
Universal Design for Learning addresses a foundation framework for teacher candidates to learn how to design and implement instruction for a broad range of students with diverse needs rather than rely exclusively on accommodations to instruction for some students.
Prerequisite: EDSP210 or EDSP470.
Restriction: Must be in Special Education program.

EDSP413 Behavior and Classroom Management in Special Education (3 Credits)
Use of applied behavior analysis for assessment of behavior and learning environments. Design of behavior and classroom management of students in special education.
Restriction: Must be in Special Education program. Jointly offered with EDSP613.
Credit Only Granted for: EDSP413, or EDSP613.

EDSP415 Assessment in Special Education (3 Credits)
Knowledge and skills for understanding assessment process and interpretation of assessment data. Emphasis on psychometric aspects of assessment related to screening, eligibility, and program planning.
Recommended: STAT100; or SOCY201.
Restriction: Must be in Special Education program. Jointly offered with EDSP615. Credit only granted f or: EDSP415, or EDSP615.

EDSP416 Reading and Writing Instruction in Special Education I (3 Credits)
Assessment and instruction of reading and writing skills for students in special education.
Restriction: Must be in Special Education program. Jointly offered with EDSP616.
Credit Only Granted for: EDSP416 or EDSP616.

EDSP417 Reading Diagnosis and Assessment (3 Credits)
Reading Diagnosis and Assessment prepares teacher candidates to assess children in general and special early childhood educations settings in the areas of reading and writing in order to plan for instruction. The course will focus on diagnostic, screening, progress monitoring, and outcome assessments in early and beginning literacy. The course is designed to provide participants with the knowledge and skills necessary to collect and use a wide range of assessment data in general education and special education settings. Includes field experience.
Prerequisite: EDSP423, EDHD431, and EDSP315; and track 1: Must have completed EDSP430 and EDSP433; OR Track 2: Must have completed EDHD415 and EDHD424.
Corequisite: EDHD322, EDHD323, EDSP321, EDHD441, EDHD442, EDHD443, and EDHD444.

EDSP420 Child Development, Birth to Three Years (3 Credits)
Child development theory and research, as well as knowledge about typical and atypical development of children from birth to three years of age. The course emphasizes learning for children with and without disabilities, and for children who are at risk due to poverty and other environmental factors. The course will introduce how children develop and the challenges they face within the domains of physical, cognitive, language, social, and emotional development, with particular attention paid to the impact of risk factors on development. Students will become familiar with delays and differences in development that may occur as the result of disability. Finally, students will learn the effects of cultural and linguistic differences on growth and development. Information about theory and research in child development for children with and without disabilities will be enhanced through a series of observational experiences, which will build upon concepts addressed during class. Includes field experiences.
Prerequisite: EDHD210 and EDHD220.
Corequisite: EDHD425 and EDHD314.
Restriction: Must be in Special Education program. Cross-listed with ED HD434.
Credit Only Granted for: EDHD419A, EDSP420 or EDHD434.

EDSP421 Field Placement in Special Education: Early Childhood I (2-4 Credits)
Field experience I in early childhood special education.
Restriction: Must be in Special Education program; or must be in one of the following programs (Special Education (Doctoral); Special Education (Master's)).

EDSP422 Curriculum and Instruction: Early Childhood Special Education (3 Credits)
Curriculum and instruction for young children with mild and moderate disabilities, preschool through primary grades.
Restriction: Must be in Special Education program. Jointly offered with EDSP627.
Credit Only Granted for: EDSP422 or EDSP627.

EDSP423 Assessment in Early Childhood Special Education (3 Credits)
Assessment procedures for infants and young children with disabilities, birth through grade 3.
Restriction: Must be in Special Education program.
Credit Only Granted for: EDSP423 or EDSP624.

EDSP424 Field Placement in Special Education: Early Childhood II (2-4 Credits)
Field experience in early childhood special education.
Restriction: Must be in Special Education program.

EDSP425 Pre-Internship I (1 Credit)
This required EDSP field placement is a 3-hour per week seminar and field placement that meets across 15 weeks. Opportunities are provided to observe and participate in instructional experiences under the guidance of an assigned Host Teacher (HT) in a four-week experience in a high incidence placement AND a four-week experience in a low incidence (LI) placement. The purpose is to provide each special education teacher candidate (TC) with practical experience to complete field-based requirements and begin to meet the CEC Initial Preparation Standards (2012). Furthermore, since EDSP 425 is the first internship experience in the Special Education Program in the College of Education at University of Maryland, teacher candidates will become familiar with the Special Education Program, College of Education, Maryland State Department of Education (MSDE), Counsel for Accreditation of Educator Preparation (CAEP), and Council for Exceptional Children (CEC) expectations and requirements for graduation and teacher licensure.
Corequisite: EDSP451 and EDSP400.
Restriction: Must be in the Special Education major.

EDSP426 Pre-Internship II (1 Credit)
A 3-hour per week seminar and field placement that meets across 15 weeks. Teacher candidates will assess and provide instruction for first grade students at a local public elementary school. The field experience is also supported through content delivered in EDSP 415/615 (Assessment in Special Education) and EDSP 416/616 (Reading and Writing Instruction in Special Education). The tutoring program is meant to provide an opportunity for teacher candidates to practice the assessment and instructional skills they are learning, while also providing a needed service to the community. Teacher candidates will work one-on-one with select first graders whose teachers have determined to be in need of extra support in reading and writing.
Corequisite: EDSP415 and EDSP416.
Restriction: Must be in the Special Education major.

EDSP430 Early Intervention: Early Childhood Special Education (3 Credits)
Intervention with infants and young children with disabilities. Focus on moderate and severe disabilities.
Restriction: Must be in Special Education program.
Credit Only Granted for: EDSP430 or EDSP631.

EDSP433 Families and Culture in Early Intervention (Birth-5) (3 Credits)
Provides students with the skills and information they need to work effectively with families of young children (birth to age 5) who have or are at risk for disabilities in early childhood or early intervention programs. Students will review current local, state and federal policies establishing the rights of families of infants and young children with disabilities to participate in decision making for their child. We will discuss relevant theoretical and research literature as well as the cultural and contextual issues involved in working with families of very young children. Includes field experiences.
Prerequisite: EDHD314 and EDHD425; and (EDHD419 or EDSP420).
Corequisite: EDSP430, EDSP315, and EDHD431.

EDSP434 Field Placement in Special Education: Secondary Middle I (2-4 Credits)
Field experience in secondary middle special education.
Restriction: Must be in Special Education program.

EDSP435 Field Placement in Special Education: Secondary Middle II (2-4 Credits)
Field experience in secondary middle special education.
Restriction: Must be in Special Education program.

EDSP443 Language and Literacy Acquisition in Children with Disabilities (3 Credits)
Language and literacy acquisition and characteristics of typical and atypical language development in supporting students with reading and writing disabilities.
Restriction: Must be in Special Education program.
Additional Information: This course is the first of four reading courses required by the Maryland State Department of Education for teacher certification in Special Education.

EDSP450 Inclusive Practices in the Schools (3 Credits)
Educational practices regarding inclusive education in the schools for students with and without disabilities.Jointly offered with EDSP606.
Credit Only Granted for: EDSP450 or EDSP6 06.

EDSP451 Curriculum and Instruction: Elementary/Middle Special Education (3 Credits)
Methods for instruction of students with disabilities in the general education curriculum. Collaboration with other professionals is included.
Restriction: Must be in Special Education program. Jointly offered with EDSP652.
Credit Only Granted for: EDSP451 or EDSP652.

EDSP452 Internship I: Elementary/Middle Special Education (2-4 Credits)
Field experience in elementary/middle school special education.
Restriction: Must be in Special Education program. Jointly offered with EDSP692.
Credit Only Granted for: EDSP452 or EDSP692.

EDSP453 Methods and Models of Instruction: Elementary Special Education (3 Credits)
Focus on models and methods of instruction responsive to the cognitive, linguistic, and cultural characteristics of elementary students in special education.
Restriction: Must be in Special Education program.
Credit Only Granted for: EDSP453 or EDSP653.

EDSP454 Field Placement in Special Education: Elementary II (2-4 Credits)
Field experience in elementary special education.
Restriction: Must be in Special Education program.

EDSP455 Assessment in Elementary Special Education (3 Credits)
Focus on selection, administration, and interpretation of assessment tools and results for designing instruction and evaluating progress of elementary students in special education.
Restriction: Must be in Special Education program. Jointly offered with EDSP654.
Credit Only Granted for: EDSP455 or EDSP654.

EDSP466 Issues and Models of Instruction: Middle/Secondary Special Education (3 Credits)
Issues, legislation, and service models in middle/secondary special education. Emphasis on career and vocational education, self-determination, and transition.
Restriction: Must be in Special Education program. Jointly offered with EDSP664.
Credit Only Granted for: EDSP466 or EDSP664.

EDSP470 Introduction to Special Education (3 Credits)
Designed to give an understanding of the needs of all types of exceptional children.
Restriction: Must not have completed EDSP210.
Credit Only Granted for: EDSP210 or EDSP470.

EDSP474 Assessment in Middle/Secondary Special Education (3 Credits)
Cognitive, vocational, and social assessment for students with disabilities. Emphasis on interpretation of assessment results and case management practices.
Restriction: Must be in Special Education program. Jointly offered with EDSP674.
Credit Only Granted for: EDSP474 or EDSP674.

EDSP476 Communicating with Sign Language (3 Credits)
Intermediate level receptive/expressive skills in American Sign Language. Aspects of the culture, history, and research perspectives of the deaf community.
Prerequisite: EDSP376.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP477 Curriculum, Assessment, and Instruction: Middle/Secondary Special Education (3 Credits)
Methods and assessment practices for effective instruction in middle and secondary content areas for students in special education.
Restriction: Must be in Special Education program. Jointly offered with EDSP677.
Credit Only Granted for: EDSP477 or EDSP677.

EDSP481 Cultural Diversity and Disability (3 Credits)
A study of diversity issues within special education, with attention to uses of race, culture, and disability as they pertain to teaching, learning, and social justice.
Restriction: Must be in Special Education program. Jointly offered with EDSP681.
Credit Only Granted for: EDSP481, EDSP499C, EDSP678C, or EDSP681.
Formerly: EDSP499C.

EDSP482 Literacy Approaches for At-Risk Adolescents (3 Credits)
Provides approaches to teaching reading in the content areas for secondary students with disabilities.
Prerequisite: Must have completed or be concurrently enrolled in EDHD426.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department. Jointly offered with EDSP682.
Credit Only Granted for: EDSP482 or EDSP682.

EDSP484 Reading and Writing Instruction in Special Education II (3 Credits)
Focus on the development of reading and writing programs for students in special education. Builds on foundations established in EDSP416.
Prerequisite: EDSP416.
Restriction: Must be in Special Education program. Jointly offered with EDSP684.
Credit Only Granted for: EDSP48 4 or EDSP684.

EDSP485 Assessment and Instruction in Mathematics in Special Education (3 Credits)
Instructional methods and assessment in mathematics in special education.
Restriction: Must be in Special Education program; or must be in one of the following programs (Special Education (Doctoral); Special Education (Master's)). Jointly offered with EDSP683.
Credit Only Granted for: EDSP485 or EDSP683.

EDSP486 Promoting Prosocial Behavior in Special Education (3 Credits)
Focus on social development among students with and without disabilities, the relationship between pedagogy and student behavior, and classroom, school, and community approaches for developing prosocial behavior.
Restriction: Must be in Special Education program.
Credit Only Granted for: EDSP486 or EDSP686.

EDSP487 Family Partnerships in Special Education (3 Credits)
Strategies for communicating and working with families of students with disabilities.
Restriction: Must be in Special Education program. Jointly offered with EDSP687.
Credit Only Granted for: EDSP487 or EDSP687.

EDSP488 Selected Topics in Teacher Education (1-3 Credits)
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department; or must be in a major in EDUC-College of Education.
Repeatable to: 6 credits if content differs.

EDSP489 Field Experiences in Special Education (1-4 Credits)
Planned field experience in education-related activities. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP490 Teacher Candidate Research Seminar in Special Education (3 Credits)
Study of current issues and research concerning the education of students in special education.
Restriction: Must be in Special Education program.

EDSP494 Internship: Early Childhood Special Education (6-12 Credits)
Student teaching, full-time for twelve weeks, with infants or preschool children with disabilities.
Restriction: Must be in Special Education program.

EDSP495 Internship II: Elementary/Middle Special Education (6-12 Credits)
Internship II is a full-time 15 week field-placement experience in a local school system working with students with disabilities in an elementary or middle school environment. Internship II allows the intern to apply and integrate teaching competencies and responsibilities by systematically increasing independence in conducting all aspects of the special education mentor teacher's role. The intern will incrementally assume responsibility for planning, instruction, management, collaboration, and other essential tasks assigned in their internship placement. The intern will be responsible for the successful completion of edTPA, seminar assignments, and self-evaluation using Live Text for Foundational Competencies (FCs) and the Performance Based Assessment (PBA). Interns will be asked to recall and integrate course content from their prerequisite coursework during seminar and their field placement experience.
Corequisite: EDSP490.
Restriction: Must be in Special Education program; or must be in one of the following programs (Special Education (Doctoral); Special Education (Master's)). Jointly offered with: EDSP695.
Credit Only Granted for: EDSP495 or EDSP695.

EDSP496 Internship: Middle/Secondary Special Education (6-12 Credits)
Student teaching, full-time for twelve weeks, with middle or high school age students with disabilities.
Restriction: Must be in Special Education program.

EDSP498 Special Problems in Special Education (1-6 Credits)
Available only to education majors who have definite plans for individual study of approved problems. Credit according to extent of work.
Prerequisite: Available only to education majors who have definite plans for individual study of approved problems.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP499 Workshops, Clinics, and Institutes in Special Education (1-6 Credits)
The following type of educational enterprise may be scheduled under this course heading: workshops conducted by the special education department (or developed cooperatively with other departments, colleges and universities) and not otherwise covered in the present course listing. Laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups such as school superintendents, principals and supervisors.
Repeatable to: 6 credits if content differs.

EDSP600 Issues and Trends in Educating Individuals with Disabilities (3 Credits)
Examines research and practice relevant to the education of individuals with disabilities.
Prerequisite: 9 credits in EDSP courses.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP601 Special Education for School Counselors (3 Credits)
Designed to give school counseling students an understanding of the needs of children with disabilities, and the school-based services that they received. The course focuses on the school counselor's role in identifying and supporting children who have disabilities.
Restriction: Must be in Counseling and Personnel Services (Master's) program.
Credit Only Granted for: EDSP470 or EDSP601.

EDSP602 Instruction of Students with Severe Disabilities I (3 Credits)
Functional assessment procedures and instructional methods for students with severe disabilities.
Restriction: Must be in Special Education (Master's) program.
Credit Only Granted for: EDSP400 or EDSP602.

EDSP603 Instruction of Students with Physical Disabilities (3 Credits)
Assessment, curriculum, and instruction for students with physical disabilities. Focus on etiology, environmental and learning adaptations, and assistive technology.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Jointly offered with EDSP40 3.
Credit Only Granted for: EDSP403 or EDSP603.

EDSP604 Education of Students with Autism Spectrum Disorder (3 Credits)
Characteristics, needs, assessment, and educational methods for students diagnosed as autistic or having a pervasive development disorder.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department. Jointly offered with EDSP404. Credit onl y granted for: EDSP404 or EDSP604.

EDSP605 The Exceptional Child and Society (3 Credits)
Relationship of the role and adjustment of the child with an exceptionality to societal characteristics.
Prerequisite: EDSP600.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP606 Advanced Study in Inclusive Practices in The Schools (3 Credits)
Educational practices regarding inclusive education in the schools for students with and without disabilities.Jointly offered with EDSP450.
Credit Only Granted for: EDSP450, EDSP606 , or EDSP788P.
Formerly: EDSP788P.

EDSP607 School Violence and Disruption (3 Credits)
An examination of school violence and disruption from multiple perspectives. Societal, community, and individual factors are examined. Prevention strategies, interagency collaboration, and intervention techniques are addressed.

EDSP609 Embracing Diversity: Teaching Students with Disabilities and Gifted Learners in Secondary (3 Credits)
Designed for secondary education majors to prepare for teaching students with disabilities in secondary classrooms. Examines the legal requirements for general education teachers in the public schools including best practices for participating in the Individual Education Program (IEP) team process, and understanding Response to Intervention (RTI) as a approach to the early identification and support of students with learning and behavior needs. Information is provided on the characteristics of students who have been identified as having high incidence disabilities (e.g., learning disabilities, attention deficit hyperactivity disorder, speech and language delays, emotional or behavioral disorders, and other health impairments). Information is also provided on the characteristics of students who are considered gifted and/or talented, as well as instructional methods for differentiating instruction to meet their needs. Also provides information on universal design (UDL) principles for learning, instructional suggestions to include students with disabilities in the general classroom, co-teaching, and methods for integrating technology and assistive technology to benefit all students.
Prerequisite: Permission of instructor.
Restriction: Permission of EDUC-Special Education department.
Credit Only Granted for: EDSP609 or EDSP632.
Formerly: EDSP609.

EDSP610 Neurodevelopment and Disability for Educators (4 Credits)
Designed for educators of students with disabilities interested in understanding cognition and learning from a neurodevelopmental perspective. Students will be introduced to the basics of neuro-anatomy as well as typical and atypical brain development as it relates to children from birth to age 21.
Restriction: Must be in the Supporting Children with Intensive Behavior Needs in a Public School Setting Post-Baccalaureate Certificate program.

EDSP611 Teaching Students with Disabilities in Elementary Classrooms (2 Credits)
This course is designed for elementary education majors to prepare for teaching students with disabilities in elementary classrooms. The course examines the legal requirements for general education teachers in the public schools including best practices for participating in the Individual Education Program (IEP) team process, and understanding Response to Intervention (RTI) as a approach to the early identification and support of students with learning and behavior needs. Information is provided on the characteristics of students who have been identified as having high incidence disabilities (e.g., learning disabilities, attention deficit hyperactivity disorder, speech and language delays, emotional or behavioral disorders, and other health impairments). The course then provides information on Universal Design for Learning (UDL) principles, instructional suggestions to include students with disabilities in the general classroom, co-teaching and methods for integrating technology and assistive technology to benefit all students.
Restriction: Permission of EDUC-Special Education department.
Credit Only Granted for: EDSP608, EDSP611, EDSP401 or EDSP499F.

EDSP612 Transition Methods and Disability Systems (3 Credits)
Philosophical and historical foundatins of transition service delivery and current methods that comprise transition services for students with disabilities.
Restriction: Permission of instructor.

EDSP613 Behavior and Classroom Management in Special Education (3 Credits)
Applied behavior analysis for assessment of behavior and learning environments. Behavior and classroom management strategies for students in special education.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program; or permission of instructor. Jointly offered with EDSP413.
Credit Only Granted for: EDSP413 or EDSP613.

EDSP614 Instruction of Students with Severe Disabilities II (3 Credits)
Functional assessment, curriculum, and instruction related to academic and community functioning skills for students with severe disabilities.
Restriction: Must be in Special Education (Master's) program.
Credit Only Granted for: EDSP410 or EDSP614.

EDSP615 Evaluation and Measurement of Exceptional Children and Youth (1-3 Credits)
Deals with the understanding and interpretation of the results of psychological and educational tests applicable for use with exceptional children and youth.
Prerequisite: EDSP600 and EDMS646; or permission of EDUC-Counseling, Higher Education and Special Education department. Jointly offered with EDSP415.
Credit Only Granted for: EDSP415 or EDSP615.

EDSP616 Reading and Writing Instruction in Special Education I (3 Credits)
Assessment and instruction of reading and writing skills and strategies for students in special education.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Jointly offered with EDSP41 6.
Credit Only Granted for: EDSP416 or EDSP616.

EDSP621 Designing Intensive Interventions for Social and Academic Skill Development for Students with Persistent Needs (3 Credits)
Prerequisite: EDSP 600, EDSP 601 or consent of instructor. Strategies to teach social and academic skills to behaviorally disordered students.
Prerequisite: EDSP600 and EDSP601; or permission of instructor.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP622 History, Research and Context in Behavioral and Learning Di sorders (3 Credits)
Examination of theoretical, historical, and contextual influences affecting the study and treatment of persons with behavioral and learning disorders.
Prerequisite: EDSP470.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP623 Challenges and Issues in Behavioral and Learning Disorders (3 Credits)
Development and outcomes for students with behavioral and learning disorders for inclusive schools, discipline, professional development and ethics.
Prerequisite: EDSP470.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP624 Assessment in Early Childhood Special Education (3 Credits)
Assessment procedures for infants and young children with disabilities, birth through age eight.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Jointly offered with EDSP42 3.
Credit Only Granted for: EDSP423 or EDSP624.

EDSP625 Seminar on Severely Handicapping Conditions (3 Credits)
Research and theories relevant to the education of severely handicapped individuals.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP626 Characteristics of Infants and Young Children: Early Childhood Special Education (3 Credits)
Focus on developmental, behavioral, and learning characteristics of infants and young children with and without disabilities.Jointly offered with EDSP420.
Credit Only Granted for: EDSP420 or EDSP6 26.

EDSP627 Curriculum and Instruction: Early Childhood Special Education (3 Credits)
Curriculum and instructor for young children with mild and moderate disabilities, preschool through primary grades.Jointly offered with EDSP422.
Credit Only Granted for: EDSP422 or EDSP6 27.

EDSP631 Early Intervention: Early Childhood Special Education (3 Credits)
Intervention with infants and young children with disabilities. Focus on moderate and severe disabilities.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Jointly offered with EDSP43 0.
Credit Only Granted for: EDSP430 or EDSP631.

EDSP632 Embracing Diversity: Teaching Students with Disabilities and Gifted Learners in Secondary (3 Credits)
Designed for secondary education majors to prepare for teaching students with disabilities in secondary classrooms. Examines the legal requirements for general education teachers in the public schools including best practices for participating in the Individual Education Program (IEP) team process, and understanding Response to Intervention (RTI) as a approach to the early identification and support of students with learning and behavior needs. Information is provided on the characteristics of students who have been identified as having high incidence disabilities (e.g., learning disabilities, attention deficit hyperactivity disorder, speech and language delays, emotional or behavioral disorders, and other health impairments). Information is also provided on the characteristics of students who are considered gifted and/or talented, as well as instructional methods for differentiating instruction to meet their needs. Also provides information on universal design (UDL) principles for learning, instructional suggestions to include students with disabilities in the general classroom, co-teaching, and methods for integrating technology and assistive technology to benefit all students.
Prerequisite: Permission of instructor.
Restriction: Permission of EDUC-Special Education department.
Credit Only Granted for: EDSP609 or EDSP632.
Formerly: EDSP609.

EDSP652 Curriculum and Instruction: Elementary Special Education (3 Credits)
Methods for instruction of students with disabilities in the general education curriculum. Collaboration with other professionals is included.Jointly offered with EDSP451.
Credit Only Granted for: EDSP451 or EDSP6 52.

EDSP654 Assessment in Elementary Special Education (3 Credits)
Focus on selection, administration, and interpretation of assessment tools and results for designing instruction and evaluating progress of elementary students in special education.Jointly offered with EDSP455.
Credit Only Granted for: EDSP455 or EDSP6 54.

EDSP664 Issues and Models:Secondary/Middle Special Education (3 Credits)
Issues, legislation, and service models in secondary/middle special education. Emphasis on career and vocational education, self-determination, and transition.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department. Jointly offered with EDSP466. Credit onl y granted for: EDSP466 or EDSP664.

EDSP665 Families, Culture, and Disability (3 Credits)
Current research on service delivery and cultural factors that influence families of children and youth with disabilities.
Prerequisite: EDSP600.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP670 Single Subject Research Designs (3 Credits)
Design, application, and analysis of single subject research in special education classrooms across all disabilities.
Prerequisite: EDSP600.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP671 Qualitative Methodologies in Special Education (3 Credits)
Design and evaluation of qualitative research in special education across disabilities and ages.
Prerequisite: EDSP600.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP673 Evaluating Evidence-Based Practices in Special Education (3 Credits)
Evaluating evidence-based practices in special education, by examining theoretical origins, use of causal designs, programmatic lines of research, and research syntheses to explore the development of what it means for an intervention to have the potential to significantly impact practice.
Prerequisite: EDMS645.
Recommended: EDSP670 and EDSP600.
Credit Only Granted for: EDSP673 or EDSP798E.
Formerly: EDSP798E.

EDSP674 Assessment in Middle/Secondary Special Education (3 Credits)
Cognitive, vocational, and social assessment for students with disabilities. Emphasis on interpretation of assessment results and case management practices.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Jointly offered with EDSP47 4.
Credit Only Granted for: EDSP474 or EDSP674.

EDSP675 Legal and Policy Foundations for Individuals with Disabilities (3 Credits)
Regulatory and statutory foundations for public policies addressing the education of children and youth with disabilities.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP677 Curriculum, Assessment, and Instruction: Middle/Secondary Special Education (3 Credits)
Methods and assessment practicies for effective instruction in middle and secondary content areas for students in special education.Jointly offered with EDSP477.
Credit Only Granted for: EDSP477 or EDSP6 77.

EDSP678 Seminar in Special Education (3 Credits)

EDSP681 Seminar in Cultural Diversity and Disability (3 Credits)
A study of diversity issues within special education, with attention to issues of race, culture, and disability as they pertain to teaching, learning, and social justice.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Jointly offered with EDSP48 1.
Credit Only Granted for: EDSP481 or EDSP681.

EDSP682 Advanced Literacy Approaches for At-Risk Adolescents (3 Credits)
Approaches to teaching reading in the content areas for secondary students with disabilities.Jointly offered with EDSP482.
Credit Only Granted for: EDSP482, EDSP488 R, EDSP682, or EDSP788R.
Formerly: EDSP788R.

EDSP683 Assessment and Instruction in Mathematics in Special Education (3 Credits)
Instructional methods and assessment in mathematics in special education.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Jointly offered with EDSP48 5.
Credit Only Granted for: EDSP485 or EDSP683.

EDSP684 Reading and Writing Instruction in Special Education II (3 Credits)
Development of effective reading and writing programs for students receiving special education services. Builds on the foundation established in EDSP 616.
Prerequisite: EDSP616.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department. Jointly offered with EDSP484.
Credit Only Granted for: EDSP484 or EDSP684.

EDSP687 Family Partnerships in Special Education (3 Credits)
Strategies for communicating and working with families of students with disabilities.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program. Jointly offered with EDSP48 7.
Credit Only Granted for: EDSP487 or EDSP687.

EDSP690 Teacher Candidate Research Seminar in Special Education (3 Credits)
Required seminar for master's certification teacher candidates in special education focusing on research methods and applications with students having disabilities.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.

EDSP691 Graduate Internship in Special Education I: Early Childhood (2-4 Credits)
Internship I in early childhood special education.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.
Credit Only Granted for: EDSP431 and EDSP691.
Formerly: EDSP431.

EDSP692 Graduate Internship I: Elementary/Middle Special Education (2-4 Credits)
Field experience in elementary/middle school special education.
Restriction: Must be in Special Education (Master's) program.
Credit Only Granted for: EDSP452 or EDSP692.

EDSP693 Graduate Internship in Special Education I: Secondary Middle (2-4 Credits)
Internship I in secondary middle special education.
Restriction: Must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.
Credit Only Granted for: EDSP436 or EDSP693.
Formerly: EDSP436.

EDSP694 Graduate Internship in Special Education II: Early Childhood (6-11 Credits)
Student teaching, full-time for twelve weeks, with infants or preschool children with disabilities.
Corequisite: EDSP690.
Restriction: Must be in Special Education program; or must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.
Credit Only Granted for: EDSP494, EDSP694, or EDSP889A.

EDSP695 Graduate Internship II: Elementary/Middle Special Education (6-11 Credits)
Internship II is a full-time 15 week eld-placement experience in a local school system working with students with disabilities in an elementary or middle school environment. Internship II allows the intern to apply and integrate teaching competencies and responsibilities by systematically increasing independence in conducting all aspects of the special education mentor teacher's role. The intern will incrementally assume responsibility for planning, instruction, management, collaboration, and other essential tasks assigned in their internship placement. The intern will be responsible for the successful completion of edTPA, seminar assignments, and self-evaluation using Live Text for Foundational Competencies (FCs) and the Performance Based Assessment (PBA). Interns will be asked to recall and integrate course content from their prerequisite coursework during seminar and their eld placement experience.
Corequisite: EDSP690.
Recommended: Must be in Special Education (Master's) program EDSPM Special Education.
Restriction: Must be in Special Education (Master's) program.
Credit Only Granted for: EDSP495, EDSP695 or EDSP888A.

EDSP696 Graduate Internship in Special Education II: Secondary Middle (6-11 Credits)
Student teaching, full-time for twelve weeks, with students with disabilities in secondary or middle school settings.
Corequisite: EDSP690.
Restriction: Must be in Special Education program; or must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.
Credit Only Granted for: EDSP496, EDSP696, or EDSP889A.

EDSP788 Selected Topics in Special Education (1-3 Credits)
Current topics and issues in teacher education.
Repeatable to: 6 credits if content differs.

EDSP798 Special Problems in Special Education (1-6 Credits)
Intended for Master's, AGS, or doctoral students in education who desire to pursue a research problem.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP799 Master's Thesis Research (1-6 Credits)
Registration required to the extent of six hours for Master's thesis.

EDSP860 Doctoral Research Seminar (3 Credits)
Issues and procedures relevant to conducting and analyzing research in special education.

EDSP872 Theory and Empirical Design in Educational Research (3 Credits)
Design and evaluation of quantitative research in special education across disabilities and ages.
Prerequisite: EDMS645 and EDMS646; or permission of EDUC-Counseling, Higher Education and Special Education department.
Restriction: Must be in Special Education (Doctoral) program.
Credit Only Granted for: EDSP672 or EDSP872.
Formerly: EDSP672.

EDSP875 Policy Issues Affecting Individuals with Disabilities (3 Credits)
An analysis of current educational and disability issues and policies pertaining to children, youth, and adults with disabilities.
Restriction: Permission of instructor; or must be in Special Education (Doctoral) program; or must be in Special Education (Master's) program.

EDSP888 Apprenticeship in Special Education (1-8 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate- seeking graduate students.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP889 Internship in Special Education (3-8 Credits)
Internship experiences at a professional level of competence in a particular role with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

EDSP898 Pre-Candidacy Research (1-8 Credits)

EDSP899 Doctoral Dissertation Research (1-8 Credits)
Registration required to the extent of 6-9 hours for an Ed.D. Project and 12-18 hours for a Ph.D. dissertation.

EDUC - Education

EDUC478 Using Information Technology in Schools (1-3 Credits)
Strategies, resources, tools and organizational concepts for using technology to facilitate classroom learning and school administrative functions.
Restriction: Permission of EDUC-College of Education; and junior standing or higher.
Repeatable to: 6 credits if content differs.

EDUC498 Selected Topics in Education (1-3 Credits)
Current topics and issues in education.
Restriction: Permission of EDUC-College of Education.
Repeatable to: 9 credits if content differs.

EDUC499 Honors Thesis (1-6 Credits)
Individual thesis work under supervision of faculty advisors; includes periodic seminar meetings with other honors students engaged in thesis work.
Prerequisite: Admission to College Honors Program.
Restriction: Permission of EDUC-College of Education.

EDUC640 Introduction to Educational Leadership (3 Credits)
The focus of this course is the analysis of the role of education administrators/leaders in the social, political, and legal contexts of schools. Also examines the role of leadership in school improvement.
Credit Only Granted for: EDHI640 or EDUC640.
Formerly: EDHI640.

EDUC645 Leading Instructional Improvement (3 Credits)
Development of knowledge and skills in the use of data bases, research findings and models of supervision, to improve instruction in schools.
Credit Only Granted for: EDHI645 or EDUC645.
Formerly: EDHI645.

EDUC646 Leading Instructional Excellence (3 Credits)
Leader's role in fostering high quality teaching and learning. Exploration of the relationship between curriculum instruction assessment and the organizational structure of K-12 public schooling. Development and assessment of frameworks for understanding instructional quality. Analysis of strategies for supporting teachers as they engage in curricular and professional development. Consideration of factors involved in creating and sustaining instructionally centered schools.
Prerequisite: EDUC645; or permission of instructor.
Credit Only Granted for: EDHI646 or EDUC646.
Formerly: EDHI646.

EDUC670 Learning Communities (3 Credits)
Reviews contemporary research on student and teacher learning and schools as learning organizations. It aims to build students understanding of opportunities and challanges to implementing learning environments in various educational organizations. Readings, cases and assignments emphasize students' understanding of learning theories and their application to various organizational settings.
Credit Only Granted for: EDHI670 or EDUC670.
Formerly: EDHI670.

EDUC671 Education Law, Finance and Policy (3 Credits)
An examination of the way judicial interpretation of common, statutory, and constitutional law shapes and constrains educational policy making. In addition, this course is designed to introduce students to issues related to the financing and resource management of public elementary and secondary schools and school systems in the United States. All discussions include dimensions of both theory and practice and specifically address reform in terms of alternatives to current practice.

EDUC689 Practicum In Educational Administration and Supervision (1-3 Credits)
Promotes skill development in managerial, leadership and supervisory areas. Practicum is based on results of diagnostic instruments and an individual professional development plan.
Repeatable to: 3 credits if content differs.

EDUC698 Advanced Topics in Education (1-3 Credits)
Arranged study on specific topics in education.
Restriction: Permission of EDUC-College of Education.
Repeatable to: 6 credits if content differs.

EDUC701 Applied Research and Data Based Decision Making for School Leaders (3 Credits)
This course focuses on understanding school system data including student assessments, teacher and administrator evaluations and other program data. Ed.D. students will learn to evaluate the technical characteristics and implications for use of such data as well as how to design instruments to collect needed data.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC701 or EDHI701.
Formerly: EDHI701.

EDUC702 Applied Research Design for Education Leaders (3 Credits)
Emphasizes quantitative and qualitative methodologies to investigate a range of educational problems. Designed for EdD doctoral students.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC702 or EDHI702.
Formerly: EDHI 702.

EDUC703 Conducting Library Research for Capstones (2 Credits)
Course is designed to provide students in the Ed.D. doctoral program in School System Leadership with the skills necessary to conduct library research in preparation for developing the literature review for the Capstone.
Restriction: Permission of EDUC-College of Education; and must be enrolled in EdD in School System Leadership.

EDUC704 Introduction to Writing for Education Leaders (2 Credits)
This course is designed to provide students in the Ed.D. program with specific strategies and skills needed to complete their Dissertation of Practice. Skills include constructing a problem statement and developing a cohesive argument for a proposed solution.
Restriction: Permission of EDUC-College of Education and Must be in EdD School System Leadership program.

EDUC705 Education Policy Making and the School Leader (4 Credits)
Course analyzes educational K-12 policies and their impacts on school systems and the leadership of those systems
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC705 or EDPL663.
Formerly: EDPL663.

EDUC740 Managing Educational Organizations in a Diverse Society (4 Credits)
Contemporary social and cultural influences that impact on the management of schools and school systems in a diverse society. The effects on schools and school systems of changes in the economy, family structure, demographics and technology will be examined.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC740 or EDHI740.
Formerly: EDHI740.

EDUC747 Advanced Seminar on Instructional Improvement for School Leaders (4 Credits)
Course addresses current issues, research, trends, and problems in the areas of instructional improvement and the responsibilities of school-based administrators in improving student learning.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC747 or EDHI747.
Formerly: EDHI747.

EDUC760 The Human Dimension in Administration (4 Credits)
Course focuses on theory, research findings, and current practices in managing human resources in educational organizations. Issues related to performance evaluations, professional development, and legal and ethical standards are addressed.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC760 or EDHI760.
Formerly: EDHI760.

EDUC767 Seminar on School District Leadership (4 Credits)
Examination of theory and research related to school district leadership with focus on improvement sciences. Course uses improvement science model to understand organizational, political, community, instructional problems of practice.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC767 or EDHI767.
Formerly: EDHI767.

EDUC770 System Innovation and Transformation (4 Credits)
Course is designed to provide EdD students understanding how complex systems improve performance and connect educational and social objectives to goals of innovation and efficiency.
Restriction: Permission of EDUC-College of Education.
Credit Only Granted for: EDUC769, EDHI788M, or EDUC770.
Formerly: EDHI788M.

EDUC773 Seminar in School Finance and Resource Management (4 Credits)
Issues related to financing and resource management in US K-12 public education systems will be investigated including how various levels of government support public education, and the revenue-generating tools they use. A major theme throughout the course will be on how the values and concepts of educational equity drive the distribution of revenue to schools and how to use data to create . a school-level resourcing plan that provides access and opportunities to learning for every student.
Prerequisite: Permission of instructor.
Restriction: Must be in the Ed.D. School System Leadership program.

EDUC828 Mid-Program Evaluation Portfolio (2-6 Credits)
Students will examine issues of performance assessment and develop a professional portfolio that follow NELP standards and assessment criteria and will compile and synthesize research/inquiry and experiential learning and reflections that demonstrate mastery of the standards.
Restriction: Permission of instructor and Must be in Ed.D. in School Leadership program.
Repeatable to: 12 credits.

EDUC829 Doctoral Capstone (1-6 Credits)
The completion of a doctoral capstone is required for all professional practice doctoral students, allowing demonstration of excellence in professional practice in the field of education leadership. The topic, activities, and outcomes related to the doctoral capstone must be approved by the doctoral advisor and capstone committee and presented and defended by the student.
Prerequisite: EDUC828.
Restriction: Successful completion of mid-program evaluation.
Repeatable to: 12 credits.

EDUC888 Applied Apprenticeship in Education (1-3 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals.
Restriction: Permission of EDUC-College of Education.
Repeatable to: 12 credits.

EDUC898 Pre-Candidacy Research (2-4 Credits)
Pre-Candidacy Research
Repeatable to: 12 credits.

EDUC899 Dissertation of Practice Research (1-6 Credits)
Registration required to the extent of 6-9 hours for an Ed.D. Dissertation.
Repeatable to: 9 credits.

EMBA - Executive MBA Program

EMBA610 Introduction to Financial Accounting (2 Credits)
Overview of financial accounting, periodic financial statements and the financial reporting process. Importance of financial statements as information source for creditors and investors and as a means by which managers can communicate information about their firms.
Restriction: Must be in Executive MBA program.

EMBA611 Managerial Accounting (2 Credits)
Use of accounting data in corporate planning and control. Cost-volume-profit analysis, budgeting, pricing decisions and cost data, transfer pricing, activity-based management, performance measures, and standard costing.
Restriction: Must be in Executive MBA program.

EMBA616 Accounting for Senior Management (3 Credits)
This course is designed to give senior managers an overview of basic financial and managerial accounting principles and tools with emphasis on those principles and tools they can use to support various managerial decision-making tasks.
Restriction: Must be in Executive MBA program.

EMBA617 Accounting for Decision Making (4 Credits)
An overview of financial accounting including the emphasis on periodic financial statements, the financial reporting process, the importance of financial statements as (i) an information source for creditors and investors and (ii) a means by which managers can communicate information about their firms. Overview of managerial accounting in corporate planning and control. Specific facets include cost-volume-profit analysis, budgeting, pricing decisions and cost data, transfer pricing, activity-based management, performance measures, and standard costing.
Restriction: Must be in Executive MBA program.

EMBA620 Strategic Information Systems (2 Credits)
Use of information technology to achieve competitive advantage, efficient operations, and effective decision making. Analysis of functions of information technology and its impact on competitive strategy and organizational operations.
Restriction: Must be in Executive MBA program.

EMBA621 Digital Transformation in Business (3 Credits)
Introduces students to the strategic role of digital transformation within businesses, and provides an overview for how major information technologies may be used to inform and transform the firm's strategic, operational, and tactical decisions. Topics discussed in the course include the strategic use of digital technologies to generate sustainable competitive value; the contributions of new forms of technology infrastructure; the evaluation of new technology investments and the resulting ROI; acquiring, managing and governing technological capabilities within the firm; understanding the role of enterprise systems and social technologies within the firm; and the management of disruptive technologies within and outside the firm.
Restriction: Must be in Executive MBA program.

EMBA630 Data Models and Decisions (3 Credits)
To develop probabilistic and statistical concepts, methods and models through examples motivated by real-life data from business and to stress the role that statistics play in the managerial decision making process.
Restriction: Must be in Executive MBA program.

EMBA637 Corporate Finance (4 Credits)
Presents key concepts in corporate finance as well as tools used in making corporate financial decisions. Topics include valuation of corporate securities, capital investment decision making, capital market theory, operation and efficiency of financial markets, corporate financing decisions, and risk management.
Restriction: Must be in Executive MBA program.

EMBA640 Financial Management (3 Credits)
Analysis of major corporate financial decisions using a market-oriented framework. Topics include capital budgeting, security portfolio theory, operation and efficiency of financial markets, options pricing, financing decisions, capital structure, payout policy and international finance.
Restriction: Must be in Executive MBA program.

EMBA647 Economics and Public Policy (4 Credits)
Introduction to the economic concepts essential to business decision-making. Concepts covered include supply, demand, cost pricing, competition, monopoly, non-competitive markets, game theory, vertical integration, regulation, national income accounting, fiscal policy, monetary policy, balance of payments accounting, exchange rates and international economics. Primary attention is given to cases.
Restriction: Must be in Executive MBA program.

EMBA650 Marketing Management (2 Credits)
Analysis of marketing problems and evaluation of specific marketing efforts regarding the organization's products and services, pricing activities, channel selection, and promotion strategies in both domestic and international markets.
Restriction: Must be in Executive MBA program.

EMBA654 Organizational Change (1-3 Credits)
This course is designed to assist you in developing the skills necessary to successfully manage change in a turbulent environment. As part of the course design, an overview of organizational change management strategies aimed at improving the organization's ability to cope with change will be covered. In addition, the course provides students with the models for understanding the dynamics of organizational change. Change management skills are among the most important skills that any professional can possess.
Restriction: Must be in Executive MBA program.

EMBA656 Leadership and Human Capital (3 Credits)
The overall objective of this course is to sensitize participants to the fact that managers face many dilemmas (such as the need to maintain control, yet be flexible enough to effectively change as the competitive environment requires); and therefore, managers need to have skills that will enable them to effectively manage and lead, and thus to become leader-managers. How managing versus leading-skills differ will be emphasized in this course. To raise participants' sensitivity to managerial dilemmas and the skills needed to effectively manage these, there will be extensive use of case discussions and video-clips about challenges faced by companies and their managers, and extensive opportunities for self-reflective and experiential exercises. The development of action-plans for implementing a desirable change in participants' current job-situation will also help participants to hone the skills needed to be effective change-agents, hence leaders, in their organization.
Restriction: Must be in Executive MBA program.

EMBA662 Leadership and Teamwork (2 Credits)
Course examines concepts of team-building and leadership which are critical to managerial success. Topics include leadership, decision-making, communication and conflict, work motivation, building effective teams, and organizational change and culture.
Restriction: Must be in Executive MBA program.

EMBA663 Managing Human Capital (2 Credits)
Course examines core human resource management principles and emphasizes skills for maximizing an organization's human capital. Topics include recruitment, selection, performance feedback and incentives, termination of poor performers, and managing organizational change through human resource systems and policies.
Restriction: Must be in Executive MBA program.

EMBA664 IT Transformation of Organizations, Industries and Markets (2 Credits)
Information technology enables the transformation of organizations, industries and markets. The purpose of this course is to understand the forces within organizations and industries that combine with the technology to create these transformations. The course focuses on general models of transformation as well as case studies of specific organizations and industries. Teams of students will select an industry and prepare a report on how technology is now or will transform it, and examine the implications for how businesses will function in the future.
Restriction: Must be in Executive MBA program.

EMBA674 Marketing Simulation (2 Credits)
This is a capstone marketing course that is taught primarily through the simulation MARKSTRAT. As we go through the simulation we will discuss marketing strategies designed to manage products in selected market segments. Topics covered include competitor analysis, buyer analysis, market segments, and product strengths and weaknesses; product related issues are identified and marketing strategies developed, assessed and implemented. The material is then complemented with the MARKSTRAT simulation. The prerequisite for this course is Marketing Management or Marketing Strategy.
Prerequisite: Must have completed Marketing Management or Marketing Strategy coursework.
Restriction: Must be in Executive MBA program.

EMBA678 Ethical Leadership (1-3 Credits)
This course will explore the following topics; Recognize the scope of managerial agency and the economic, legal and ethical responsibilities to various stakeholders, Conduct elementary ethical analyses of managerial situations using the principal schools of ethical reasoning, Identify the economic and ethical properties of a market mechanism, and the means for addressing the limitations of a market, and Recognize ethical leadership as the exercise of managerial agency in changing existing values and practices.
Restriction: Must be in Executive MBA program.
Repeatable to: 3 credits if content differs.

EMBA681 Managerial Economics and Public Policy (2 Credits)
Basic microeconomic principles used by firms, including supply and demand, elasticities, costs, productivity, pricing, marketing structure and competitive implications of alternative market structures. Market failures and government intervention. Public policy processes affecting business operations.
Restriction: Must be in Executive MBA program.

EMBA683 The Global Economic Environment (2 Credits)
Relationship between national and international economic environments. Determinants of output, interest rates, prices and exchange rates. Analysis of effect of economic policies (fiscal, monetary, trade, tax) on the firm and the economy.
Restriction: Must be in Executive MBA program.

EMBA688 Strategic Management (1 Credit)
This course aims to give you the tools, frameworks, and ideas necessary to develop business units and corporate strategies for your oraganizations that fit, both in the short run and long run. As noted above, this requires that we appreciate how best to analyze and identify profit opportunities and threats in different industies and competitive environments; how best to analyze and identify your organization's valuable assets, resources and capabilities and how they might be protected, leveraged, and extended inthe market; how to organize your firm to be best prepared to adapt its strategy over time as the market environment changes; how to use organic growth as well as mergers, acquisitions, joint ventures, alliances, and divestitures to ensure that your organization around its strategy to maximize the probability of successful strategy implementation.
Restriction: Must be in Executive MBA program.
Repeatable to: 3 credits if content differs.

EMBA690 Strategic Management (2 Credits)
Integrative strategic management focusing on strategy formulation and implementation in domestic and global settings. Industry and competitor analysis, industry and firm value chain, leadership, goal setting, organizational structure and culture. Case study approach to top management and organizational problems.
Restriction: Must be in Executive MBA program.

EMBA693 Supply Chain (2 Credits)
The age of the real-time supply chain has finally arrived. Companies can now connect instantaneously with suppliers, distributors, manufacturers, customers, and alliance partners around the world. On-line access to up-to-the minute information enables companies to improve communication and project management across the entire supply chain, promote collaboration across departments, and enhance customer service and financial operations. The results are stunning; for example, a recent survey reports dramatic increases in revenues and customer retention and decreases in operating costs and product cycle times. As competition heats up from every direction, the ability to design and manage your supply chain with precision and speed becomes a business imperative. This course offers a practical blueprint for building, implementing, and sustaining supply chains in today's rapidly changing environment.
Restriction: Must be in Executive MBA program.

EMBA694 Operations Management (2 Credits)
A firm has the opportunity to create competitive advantage through proficient management of its operations. To do so, the firm must first recognize and establish the strategic role of its operations within the organization. Then, at the more detailed operational level, the firm must execute effectively and efficiently. This course examines the strategic role that the operations function can play, and offers specific tools and techniques that the firm can use for strategy execution. We cover concepts of operations managment applied to both manufacturing and services, including operations strategy, analysis of process flows and bottlenecks, waiting line models, total quality management, six sigma, and revenue management.
Restriction: Must be in Executive MBA program.

EMBA711 Financial Planning and Control Systems (2 Credits)
The role accounting plays in planning and controlling issues within organizations. It takes a high-level view of planning and control and will encourage you to take a very broad view of the topic.
Restriction: Must be in Executive MBA program.

EMBA724 International Financial Management (3 Credits)
The role of financial management in the multinational firm. The financing and managing of foreign investments, assets, currencies, imports and exports. National and international financial institutions and markets.
Prerequisite: EMBA640.
Restriction: Must be in Executive MBA program.

EMBA757 Marketing Strategy (3 Credits)
A capstone marketing course. Marketing strategies designed to manage products in selected market segments. Topics covered include competitor analysis, buyer analysis, market segments, and product strengths and weaknesses; product related issues are identified and marketing strategies developed, assessed and implemented.
Restriction: Must be in Executive MBA program.

EMBA758 Special Topics (2-3 Credits)
Selected advanced topics in the various fields of graduate study in business.
Restriction: Must be in Executive MBA program.
Repeatable to: 12 credits if content differs.

EMBA759 Independent Study (1-6 Credits)
Independent study for Masters students in Business.
Restriction: Must be in Executive MBA program.
Repeatable to: 12 credits if content differs.

EMBA778 Special Topics (2-3 Credits)
Selected advanced topics in the various fields of graduate study in business.

EMBA788 Executive Skills Mastery (1-2 Credits)
This course is designed to focus on the development of the specific set of skills that executives need to successfully perform in today's organizational environment. Students complete assessments which help to target their specific skill level and in the aggregate give instructors clear ideas on the needs of the cohort. The assessments also augment executive coaching, when provided. This is typically registered as a one credit course except when a particular program's cirriculum allocates enough contact hours to all course topics to be covered at a more advanced level.
Repeatable to: 12 credits if content differs.
Formerly: BMGT788A.

EMBA789 Leadership Mastery (1-2 Credits)
This course addresses organizational challenges from the CEO or C-level perspective. At this level, the ability to engage ambiguity and chaos effectively is essential. Creating strategy while using a systems approach and understanding how each functional area interacts with the other (with both the short-term and long-term in mind) are of very high importance. The course covers topics that consume the days of senior level leaders in organizations. This is typically registered as a one credit course except when a particular program's cirriculum allocates enough contact hours to all course topics to be covered at a more advanced level.
Repeatable to: 12 credits if content differs.
Formerly: BMGT788B.

EMBA798 Action Learning Project (1-2 Credits)
This course is designed to give the student the opportunity to work on a real-time, salient business challenge or issue for the sponsoring organization. This is often the student's employer. Students are encouraged to design projects which extend beyond a single functional area and require them to examine the interaction of multiple functional areas from a systems perspective. Students work in teams for the projects. This allows them to learn from one another, as well as to learn how to work more effectively in teams - especially in a largely virtual environment. This is typically a two credit course when projects are initiated and completed entirely within a single term. It may be a one credit course when projects extend over more than one term.
Repeatable to: 9 credits if content differs.

ENAE - Engineering, Aerospace

ENAE403 Aircraft Flight Dynamics (3 Credits)
Study of motion of aircraft, equations of motion, aerodynamic force representation, longitudinal and lateral motions, response to controls and to atmospheric disturbances, handling qualities criteria and other figures of merit.
Prerequisite: ENAE414 and ENAE432.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE404 Space Flight Dynamics (3 Credits)
Three-dimensional motion under central fields. Solutions to orbital motion, orbital elements, time elements. Kepler's laws. Orbital maneuvering, rendezvous and station-keeping. Rigid-body attitude dynamics, spacecraft attitude dynamics.
Prerequisite: ENAE301.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE414 Aerodynamics II (3 Credits)
Aerodynamics of inviscid incompressible flows. Aerodynamic forces and moments. Fluid statics/buoyancy force. Vorticity, circulation, the stream function and the velocity potential. Bernoulli's and Laplace's equations. Flows in low speed wind tunnels and airspeed measurement. Potential flows involving sources and sinks, doublets, and vortices. Development of the theory of airfoils and wings.
Prerequisite: ENAE311.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department. And junior standing or higher.

ENAE415 Helicopter Theory (3 Credits)
Elementary exposition on the theory and practice of aerodynamics applied to helicopters and other rotary wing aircraft.
Prerequisite: ENAE414.
Restriction: Must be in Engineering: Aerospace program.

ENAE420 Computational Structural Mechanics (3 Credits)
Introductory of finite element methods for aerospace engineering modeling and analysis; equips students with ability to understand manuals of commercial finite element analysis software.
Prerequisite: ENES220 and MATH241; and must have completed a course in linear algebra.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE423 Vibration and Aeroelasticity (3 Credits)
Dynamic response of single and multiple degrees of freedom systems, finite element modeling, wing divergence, aileron reversal, wing and panel flutter.
Prerequisite: ENAE324.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE425 Mechanics of Composite Structures (3 Credits)
Introduction to structures composed of composite materials and their applications in aerospace. In particular, filamentary composite materials are studied. Material types and fabrication techniques, material properties, micromechanics, anisotropic elasticity, introduction to failure concepts.
Prerequisite: MATH246, ENAE324, ENES220, and MATH241.

ENAE432 Control of Aerospace Systems (3 Credits)
An introduction to the feedback control of dynamic systems. Laplace transforms and transfer function techniques; frequency response and Bode diagrams. Stability analysis via root locus and Nyquist techniques. Performance specifications in time and frequency domains, and design of compensation strategies to meet performance goals.
Prerequisite: Minimum grade of C- in ENAE301 and ENAE283.
Restriction: Junior standing or higher; and must be in Engineering: Aerospace program.

ENAE441 Space Navigation and Guidance (3 Credits)
Principles of navigation. Celestial, radio, and inertial navigation schemes. Navigational and guidance requirements for orbital, planetary, and atmospheric entry missions. Fundamentals of communications and information theory. Link budgets, antennas and telemetry systems.
Prerequisite: ENAE404 and ENAE432.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE450 Robotics Programming (3 Credits)
Introduces students to the Robot Operating System (ROS) as well as to many of the available tools commonly used in robotics. Lectures focus on theory and structure, whereas laboratory sections will focus on applications and implementations. Students learn how to create software and simulations, interface to sensors and actuators, and integrate control algorithms. The course works through exercises involving a number of autonomous robots (i.e., ground and air vehicles) that students will eventually use in their subsequent RAS minor courses. Topics include: ROS architecture, console commands, ROS packages, simulation environments, visualizations, autonomous navigation, manipulation, and robot vision.
Prerequisite: ENME480 or ENAE380.
Restriction: Must be in the Robotics and Autonomous Systems (RAS) minor; or permission of department.
Additional Information: Students in the Robotics and Autonomous Systems minor should take ENME480 as a prerequisite; Aerospace Engineering students not in the minor should take ENAE380.

ENAE455 Aircraft Propulsion and Power (3 Credits)
Thermodynamic cycle analysis, aerothermochemistry of fuels and propellants, operating principles of piston, turbojet, fanjet, and other variations of airbreathing aircraft power units.
Prerequisite: ENES232, ENAE414, and ENAE311.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE457 Space Propulsion and Power (3 Credits)
Thermodynamic cycle analysis, aerothermochemistry of fuels and propellants, operating principles of rocket, ion, and other exoatmospheric power units.
Prerequisite: PHYS271, ENES232, PHYS270, and ENAE311.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department. And senior standing.

ENAE464 Aerospace Engineering Laboratory (3 Credits)
Application of fundamental measuring techniques to measurements in aerospace engineering. Includes experiments in aerodynamics, structures, propulsion, flight dynamics and astrodynamics. Correlation of theory with experimental results.
Prerequisite: ENAE324, ENAE362, ENAE311, and ENAE432.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE471 Aircraft Flight Testing (3 Credits)
Provides basic instruction to aircraft flight testing and demonstrates need for systematic, well-proven technique to allow for accurate airplane performance. Concepts of aerodynamics, airplane performance, and stability and control. Emphasis on single-engine general aviation type aircraft.
Prerequisite: ENAE414.
Corequisite: ENAE403.
Restriction: Must be in Engineering: Aerospace program.

ENAE481 Principles of Aircraft Design (3 Credits)
Aircraft design principles blending both synthesis and analysis. The iterative nature of the design process. Applied aerodynamics. Elements of aircraft performance calculation and optimization. Design of aircraft including payload, crew and avionics provisions, propulsion selection and sizing, aerodynamic configuration optimization, mass properties, stability and control characteristics, and vehicle subsystems. Individual student projects in aircraft design.
Prerequisite: ENAE324, ENAE362, and ENAE432.
Corequisite: ENAE414.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE482 Aeronautical Systems Design (3 Credits)
Senior capstone design course in the aeronautics track. Introduction of computerized methods for sizing and performance analysis. More comprehensive methods to predict weight, aerodynamics and propulsion system characteristics. Consideration in design disciplines such as vulnerability, maintainability, produceability, etc. Groups of students will complete, brief and report on a major design study to specific requirements.
Prerequisite: ENAE455, ENAE423, ENAE403, and ENAE481.
Restriction: Must be in Engineering: Aerospace program; and senior standing or higher.

ENAE483 Principles of Space Systems Design (3 Credits)
Principles of space systems analysis and vehicle design. Launch vehicle performance analysis and optimization. Design of vehicle systems including avionics, power, propulsion, life support, human factors, structures, actuator and mechanisms, and thermal control. Design processes and design synthesis. Individual student projects in vehicle design.
Prerequisite: ENAE404, ENAE324, ENAE362, and ENAE432.
Restriction: Must be in Engineering: Aerospace program; or permission of ENGR-Aerospace Engineering department.

ENAE484 Space Systems Design (3 Credits)
Senior capstone design course in the space track. Group preliminary design of a space system, including system and subsystem design, configuration control, costing, risk analysis, and programmatic development. Course also emphasizes written and oral engineering communications.
Prerequisite: ENAE423, ENAE483, ENAE441, and ENAE457.
Restriction: Must be in Engineering: Aerospace program.

ENAE488 Topics in Aerospace Engineering (1-4 Credits)
Technical elective taken with the permission of the student's advisor and instructor. Lecture and conference courses designed to extend the student's understanding of aerospace engineering. Current topics are emphasized.
Prerequisite: Permission of student's advisor required.
Restriction: Permission of instructor.

ENAE499 Elective Research (3 Credits)
Undergraduate research project and paper conducted under the direction of an aerospace engineering faculty member to be presented at a conference or competition.
Prerequisite: Permission from student's advisor required.
Restriction: Senior standing or higher; and must be in Engineering: Aerospace program; and permission of instructor; and permission of ENGR-Aerospace Engineering department.
Repeatable to: 6 credits if content differs.

ENAE601 Astrodynamics (3 Credits)
Mathematics and applications of orbit theory, building upon the foundations developed in ENAE 404 and ENAE 441. Topics include two body orbits, solutions of Kepler's equation, the two-point boundary value problem, rendezvous techniques, and Encke's method.
Prerequisite: ENAE404; or permission of ENGR-Aerospace Engineering department.

ENAE602 Spacecraft Attitude Dynamics and Control (3 Credits)
Rigid body rotational dynamics of spacecraft; forced and unforced motion, torques produced by the orbital environment; orbit/attitude coupling; gas jet, momentum wheel, and magnetic torque actuators. Elementary feedback attitude regulators and algorithms for linear and nonlinear attitude tracking.
Prerequisite: ENAE404 and ENAE432.

ENAE603 Near-Earth Object Exploration (3 Credits)
An overview of the near-Earth objects (NEOs) of our solar system--the asteroids and comets whose orbits closely approach Earth's orbit--and what we know about them, what we're learning about them, and how to design spacecraft missions to interact with them.
Prerequisite: ENAE601.
Restriction: Must be in one of the following programs (ENGR: MS/PhD-Aerospace Engineering (Master's); ENGR: MS/PhD-Aerospace Engineering (Doctoral)).
Credit Only Granted for: ENAE788N or ENAE603.
Formerly: ENAE788N.

ENAE631 Helicopter Aerodynamics I (3 Credits)
A history of rotary-wing aircraft, introduction to hovering theory, hovering and axial flight performance, factors affecting hovering and vertical flight performance, autorotation in vertical descent, concepts of blade motion and control, aerodynamics of forward flight, forward flight performance, operational envelope, and introduction to rotor acoustics.
Prerequisite: ENAE414 and ENAE311. Or permission of ENGR-Aerospace Engineering department; and permission of instructor.

ENAE632 Helicopter Aerodynamics II (3 Credits)
Basic aerodynamic design issues associated with main rotors and tail rotors, discussion of detailed aerodynamic characteristics of rotor airfoils, modeling of rotor airfoil characteristics, review of classical methods of modeling unsteady aerodynamics, the problem of dynamic stall, review of methods of rotor analysis, physical description and modeling of rotor vortical wakes, discussion of aerodynamic interactional phenomena on rotorcraft, advanced rotor tip design, physics and modeling of rotor acoustics.
Prerequisite: ENAE631; and (ENAE414 and ENAE311; or students who have taken courses with comparable content may contact the department). Or permission of ENGR-Aerospace Engineering department.

ENAE633 Helicopter Dynamics (3 Credits)
Flap dynamics. Mathematical methods to solve rotor dynamics problems. Flap-lag-torsion dynamics and identify structural and inertial coupling terms. Overview on rotary wing unsteady aerodynamics. Basic theory of blade aeroelastic stability and ground and air resonance stability, vibration analyses and suppression.
Prerequisite: ENAE631. Or permission of ENGR-Aerospace Engineering department; and permission of instructor.

ENAE634 Helicopter Design (3 Credits)
Principles and practice of the preliminary design of helicopters and similar rotary wing aircrafts. Design trend studies, configuration selection and sizing methods, performance and handling qualities analyses, structural concepts, vibration reduction and noise. Required independent design project conforming to a standard helicopter request for proposal (RFP).
Prerequisite: ENAE631. Or permission of ENGR-Aerospace Engineering department; and permission of instructor.

ENAE635 Helicopter Stability and Control (3 Credits)
Advanced dynamics as required to model rotorcraft for flight dynamic studies. Development of helicopter simulation models and specifications of handling qualities. Methods for calculation of trim, poles, frequency response, and free flight response to pilot inputs.
Prerequisite: ENAE631.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE636 Helicopter Dynamics II (3 Credits)
Aerodynamics, dynamics and aeromechanics of helicopters and tilt rotor aircraft. Experimental testing and mathematical modeling required for the design and analysis of such aircraft.
Credit Only Granted for: ENAE788R or ENAE636.
Formerly: ENAE788R.

ENAE641 Linear System Dynamics (3 Credits)
Linear systems; state space, multi-input, multi-output models; eigenstructure; controllability, observability, singular value analysis; multivariable Nyquist condition; observer design; introduction to Kalman filtering. Full state feedback techniques including pole placement and LQR/LQG techniques; introduction to loop shaping and robustness.
Prerequisite: ENAE432.

ENAE642 Atmospheric Flight Control (3 Credits)
Exposure to flight guidance and control. Draws heavily from vehicle dynamics as well as feedback theory, and careful treatment of the non-linear aspects of the problem is critical. Conventional sythesis techniques are stressed, although modern methods are not ignored. Multivariable system analysis is included, along with flight-control design objectives and hardware limitations. Emphasis on aircraft and missiles.
Prerequisite: ENAE403 and ENAE432; or students who have taken courses with comparable content may contact the department.

ENAE646 Advanced Dynamics of Aerospace Systems (3 Credits)
Introduces the principles and methods for formulating and analyzing mathematical models of aerospace systems using Newtonian, Lagrangian, and Hamiltonian formulations of particle and rigid body dynamics. Additional topics include applied dynamical systems, geometric mechanics, and symmetry and reduction.
Prerequisite: ENAE301.
Credit Only Granted for: ENAE788G or ENAE646.
Formerly: ENAE788G.

ENAE647 Flexible Multi-body Dynamics (3 Credits)
Review of particle dynamics, rigid body kinematics, analytical dynamics, constraint equations in multibody dynamics, methods for enforcing kinematic constraint, formulation of flexible bodies in multibody dynamics, finite element modeling, and numerical integration methods.
Prerequisite: ENAE646.
Restriction: Must be in one of the following programs (ENGR: MS/PhD-Aerospace Engineering (Doctoral); ENGR: MS/PhD-Aerospace Engineering (Master's)).
Credit Only Granted for: ENAE788Q or ENAE647.
Formerly: ENAE788Q.

ENAE651 Smart Structures (3 Credits)
Topics related to the analysis, design, and implementation of smart structures and systems: modeling of beams and plates with induced strain actuation; shape memory alloys; electro-rheological fluids; magnetostrictor and electrostricter actuators and fiber optic sensors.

ENAE652 Computational Structural Mechanics (3 Credits)
Fundamentals of structural mechanics and computational modeling. Finite element modeling of two- and three-dimensional solids, plates and shells. Geometrically nonlinear behavior. Structural stability such as buckling and postbuckling.
Restriction: Permission of instructor; and permission of ENGR-Aerospace Engineering department.
Credit Only Granted for: ENME 674, ENAE652, ENPM652 or ENPM808F.

ENAE653 Nonlinear Finite Element Analysis of Continua (3 Credits)
Finite element formulation of nonlinear and time dependent processes. Introduction to tensors, nonlinear elasticity, plasticity and creep. Application to nonlinear solids including aerospace structures, such as shells undergoing finite rotations.
Prerequisite: ENAE652; or students who have taken courses with comparable content may contact the department.

ENAE654 Mechanics of Composite Structures (3 Credits)
An introduction to structures composed of composite materials and their applications in aerospace. In particular, filamentary composite materials are studied. Material types and fabrication techniques, material properties, micromechanics, anisotropic elasticity, introduction to failure concepts.

ENAE655 Structural Dynamics (3 Credits)
Advanced principles of dynamics necessary for structural analysis; solutions of eigenvalue problems for discrete and continuous elastic systems, solutions to forced response boundary value problems by direct, modal, and transform methods.

ENAE656 Aeroelasticity (3 Credits)
Topics in aeroelasticity: wing divergence; aileron reversal; flexibility effects on aircraft stability derivatives; wing, empennage and aircraft flutter; panel flutter; aircraft gust response; and aeroservoelasticity of airplanes.
Prerequisite: ENAE655.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE663 Introduction to Plasmas for Space Propulsion and Power (3 Credits)
Characteristics of plasmas, motion of charged particles in fields, collisional processes, kinetic theory, fluid desctiption of plasmas, transpot properties, equilibrium vs. non-equilibrium, generation of plasmas.
Recommended: PHYS270 or equivalent.

ENAE665 Advanced Airbreathing Propulsion (3 Credits)
Advanced treatment of airbreathing propulsion technologies, propulsion system analysis, and engine/airframe integration. Topics will vary, but may include novel engine cycles, advanced gas turbine systems, pulsed systems, and high-speed engines, including scramjets and combined cycle systems.
Prerequisite: ENAE674 and ENAE455; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.

ENAE667 Advanced Space Propulsion and Power (3 Credits)
Advanced treatment of selected space propulsion and power technologies, methods of analysis and performance estimation. Topics will vary each year as time permits, but may include cold gas systems, chemical, nuclear, arcjets, beamed energy, and electric propulsion systems, as well as other advanced concepts.
Prerequisite: ENAE663.
Restriction: Permission of instructor.

ENAE673 Aerodynamics of Incompressible Fluids (3 Credits)
Introduces the fundamental concepts of incompressible flows. Topics to be addressed include the conservation equations, potential flow, lift and drag, Navier-Stokes equations, boundary layers and similarity solutions, and solutions to classical problems.
Prerequisite: Undergraduate courses in differential equations, incompressible, and compressible flow (ENAE311; and one course from ENAE414; ENME331, OR ENME640, or equivalent).
Restriction: Must be in ENGR: MS/PhD-Aerospace Engineering (Master's) program.

ENAE674 Aerodynamics of Compressible Fluids (3 Credits)
One-dimensional flow of a perfect compressible fluid. Shock waves. Two-dimensional linearized theory of compressible flow. Two-dimensional transonic and hypersonic flows. Exact solutions of two-dimensional isotropic flow. Linearized theory of three-dimensional potential flow. Exact solution of axially symmetrical potential flow. One-dimensional flow with friction and heat addition.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE675 Unsteady Aerodynamics (3 Credits)
Classical theories of incompressible unsteady aerodynamics with an introduction to modeling techniques. Topics include: unsteady Bernoulli's equation, added mass, the indicial response method, dynamic stall, and modern applications.
Prerequisite: ENAE414; and permission of instructor.
Credit Only Granted for: ENAE672 or ENAE675.
Formerly: ENAE672.

ENAE676 Turbulence (3 Credits)
Physical and statistical descriptions of turbulence; review of phenomenological theories for turbulent flows; scales of motion; correlations and spectra; homogeneous turbulent flows; inhomogeneous shear flows; turbulent flows in pipes and channels; turbulent boundary layers; theory of methods for turbulent flows (Reynolds stress equations, LES, DES, DNS); experimental methods for turbulence measurements.
Prerequisite: ENAE673.
Recommended: ENAE674.

ENAE681 Engineering Optimization (3 Credits)
Methods for unconstrained and constrained minimization of functions of several variables. Sensitivity analysis for systems of algebraic equations, eigenvalue problems, and systems of ordinary differential equations. Methods for transformation of an optimization problem into a sequence of approximate problems. Optimum design sensitivity analysis.

ENAE682 Hypersonic Aerodynamics (3 Credits)
Hypersonic shock and expansion waves, Newtonian theory, Mach methods, numerical solutions to hypersonic inviscid flows, hypersonic boundary layer theory, viscous interactions, numerical solutions to hypersonic viscous flows. Applications to hypersonic vehicles.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE683 High Temperature Gas Dynamics (3 Credits)
Aspects of physical chemistry and statistical thermodynamics necessary for the analysis of high temperature flows, equilibrium and nonequilibrium chemically reacting flows, shock waves, nozzle flows, viscous chemically reacting flow, blunt body flows, chemically reacting boundary layers, elements of radiative gas dynamics and applications to hypersonic vehicles.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE684 Computational Fluid Dynamics I (3 Credits)
Partial differential equations applied to flow modelling, fundamental numerical techniques for the solution of these equations, elliptic, parabolic, and hyperbolic equations, elements of finite difference solutions, explicit and implicit techniques. Applications to fundamental flow problems.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE685 Computational Fluid Dynamics II (3 Credits)
Continuation of ENAE 684. Basic algorithms for the numerical solution of two and three dimensional inviscid and viscous flows. Applications to internal and external flow problems.
Prerequisite: ENAE684.
Restriction: Permission of ENGR-Aerospace Engineering department.

ENAE688 Seminar (1-3 Credits)

ENAE691 Satellite Design (3 Credits)
Systems design of Earth-orbiting satellites, including geostationary communications satellites and low Earth orbit constellations. Basics of orbital motion, communications, and instrument design. Spacecraft systems, structural design, thermal design, power generation, and attitude determination and control. Launch vehicle interfacing and mission operations.
Prerequisite: ENAE483.

ENAE692 Introduction to Space Robotics (3 Credits)
Introduction to the kinematics, dynamics, and control of robot manipulators. DH parameters, serial and parallel manipulators, kinematic redundancy, sensors, actuators, and mechanism design. Control concepts introduced ranging from independent joint control to impedance control. Examples drawn from space robotics, wearable robotics, and other areas.
Prerequisite: ENAE301 or ENES221.
Recommended: ENAE432.

ENAE694 Spacecraft Communications (3 Credits)
Brief overview of satellite orbits. Radio frequency communications, noise, and bandwidth limitations. Link budget analysis. Modulation and multiplexing approaches, multiple access systems. Satellite transponder and Earth station technology.

ENAE696 Spacecraft Thermal Design (3 Credits)
Thermal sources in space. Black-body radiation; absorptivity and emissivity; radiative thermal equilibrium. Mutually radiating plates, view angles, and interior conduction. Techniques of spacecraft thermal analysis; approaches to passive and active thermal control.

ENAE697 Space Human Factors and Life Support (3 Credits)
Engineering requirements supporting humans in space. Life support design: radiation effects and mitigation strategies; requirements for atmosphere; water, food, and temperature control. Accommodations for human productivity in space: physical and psychological requirements; work station design; and safety implication of system architectures. Design and operations for extra-vehicular activity.

ENAE741 Interplanetary Navigation and Guidance (3 Credits)
Interplanetary trajectory construction; patched and multiconic techniques. Methods of orbit and attitude determination; applied Kalman filtering. Guidance algorithms and B-plane targeting. Interplanetary navigation utilizing in situ and radio techniques.
Prerequisite: ENAE601 and ENAE432.

ENAE742 Robust Multivariable Control (3 Credits)
Limitations on achievable performance in multivariable feedback systems due to uncertainty. Singular values, matrix norms, multivariable Nyquist stability theory, uncertainty modeling in aerospace systems. Loop-shaping, generalization of Bode design principles. Characterizing the uncertainty, robustness and performance analysis, and synthesis, primarily in the frequency domain. Current research directions. Aerospace examples are used to complement the theory.
Prerequisite: ENAE641.

ENAE743 Applied Nonlinear Control of Aerospace Systems (3 Credits)
Mathematics and methods of nonlinear systems analysis and nonlinear control design, including nonlinear models and phenomena, Lyapunov stability, input-output stability, passivity and frequency domain analysis, nonlinear controllability and observability, feedback linearization, sliding mode control, and integrator backstepping.
Prerequisite: ENAE641.

ENAE757 Advanced Structural Dynamics (3 Credits)
Demonstrate the practical application of Smart Materials and Spatially Distributed Transducers to the design and control of advanced structures. The course will be focused toward the active control of continuum structures using advance Spatially Distributed Parameter System control techniques and concepts. Effective system parameterizations will be used to reduce distributed parameter system models to classical canonical state space form for the purpose of robust adaptive structure design. Application case studies, including morphing structures will be employed as necessary to enhance the students intuition and understanding of Distributed Parameter Systems.
Prerequisite: ENAE655; or students who have taken courses with comparable content may contact the department.

ENAE788 Selected Topics in Aerospace Engineering (1-3 Credits)

ENAE791 Launch and Entry Vehicle Design (3 Credits)
Design of aerospace vehicles for atmospheric transit to and from space. Generic formulation of atmospheric flight dynamics. Ballistic and lifting entry trajectories. Estimation of vehicle aerodynamic properties and aerothermodynamic heating. Entry thermal protection design. Trajectory analysis of sounding rockets and orbital launch vehicles. Serial, parallel, and hybrid multistaging schemes, optimal multistaging. Constrained trajectory optimization. Launch vehicle economic and reliability analysis, flight termination systems, sensors and actuators.
Prerequisite: ENAE601.

ENAE799 Master's Thesis Research (1-6 Credits)

ENAE898 Pre-Candidacy Research (1-8 Credits)

ENAE899 Doctoral Dissertation Research (1-8 Credits)

ENCE - Engineering, Civil

ENCE402 Simulation and Design of Experiments for Engineers (3 Credits)
Review of statistics and hypothesis testing, sample design and design of experiments, generation of discrete and continuous distributions and their applications. Introduction of simulation languages and simulation of discrete and continuous engineering systems. Output analysis, model validation and sensitivity and reliability analysis.
Prerequisite: ENCE302; and permission of ENGR-Civil & Environmental Engineering department.

ENCE411 Environmental Engineering Science (3 Credits)
Introduces the analytical techniques available to assess performance of engineering processes as they relate to water, soil, and air treatment and quality. The basic principles of environmental management, economics of waste treatment, by-product reutilization, and energy cycles are introduced and discussed. Alternative technologies are introduced and evaluated mostly by assessing their potential to reduce waste, minimize energy use, and promote sustainability. Students' activities include, a weekly lab to provide hands-on experience with environmental quality measurements and treatment techniques; on-site visits to regional industries that undertake sustainable practices; and a final research project where experimental design and laboratory techniques are used to assess interactions between technologies and natural systems and their potential for reducing environmental impacts.
Prerequisite: ENCE310; and permission of ENGR-Civil & Environmental Engineering department.

ENCE412 Environmental Engineering Unit Operations (3 Credits)
Examination of unit operations and processes encountered in environmental engineering field. Fundamental principles learned from previous classes will be applied into the design and operation of unit operations and processes, particularly in the area of water and wastewater treatment. Similar processes will be applied to air pollution control, solid waste disposal and hazardous waste treatment.
Prerequisite: ENCE305 and ENCE310; and permission of ENGR-Civil & Environmental Engineering department.

ENCE420 Selection and Utilization of Construction Equipment (3 Credits)
Learn to evaluate and select construction equipment with a focus on mechanized equipment for earthwork and building construction.Learn about the parties involved in procurement, operation and maintenance, and how to cost-effectively plan, select, and utilize equipment for earthmoving, paving, formwork, trenching, rock excavation, tunneling, site preparation, and steel and concrete construction. Explore trends in equipment design, construction automation, and robotics.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management minor.

ENCE421 Legal Aspects of Architectural and Engineering Practice (3 Credits)
Learn the basic structure of the US legal system and court procedures and legal principles relevant to architectural and engineering design and construction contracts including principles of ethical, legal and professional conduct of engineers and architects.Topics include: contracts for design and construction, sales and warranties, torts and product liability, business agency and government agencies, professional liability of architects and engineers, labor laws, expert testimony, mediation and arbitration, tangible property including real estate, intellectual property including trademarks, patents and copyrights, insurance and sureties.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management minor; or must be in the Project Management Minor. And permission of ENGR-Civil & Environmental Engineering department.

ENCE422 Project Cost Accounting and Economics (3 Credits)
Learn: the fundamentals of accounting; project cost accounting principles as they apply to project management; project cost accounting; and the fundamentals of engineering economics.Topics include: project feasibility analysis; reading and analyzing financial statements; cash management; cash flow analysis; depreciation and taxes; and impact on profitability; the principles of activity based costing; net present value analysis; the framework for project performance measurement, cost performance indices, and earned value analysis.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management Minor; or must be in the Project Management Minor.

ENCE423 Project Planning, Estimating & Scheduling (3 Credits)
Learn the fundamentals of project planning, estimating, and scheduling. Understand the concepts of planning; to reduce uncertainty, improve efficiency of the operation, to set and meet objectives, and to provide a basis for monitoring and controlling the work. Be introduced to: the concepts of resource definition, assignment and management, and; the basics of project estimating (pricing) methods including global pricing strategies, types of estimates, pricing processes, overhead and profit, and project financing.Learn the basics of project scheduling including; bar charts, network-based methodologies, and linear scheduling techniques. Emphasis is placed on Critical Path Method (CPM) scheduling, a network based methodology. Be exposed to the use of scheduling software and will actually develop a CPM schedule for an actual construction project as part of a semester project.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management Minor; or must be in the Project Management Minor. And permission of ENGR-Civil & Environmental Engineering department.

ENCE424 Communication for Project Managers (3 Credits)
Learn the fundamentals of communications for project managers. Emphasis is on interpersonal and group communications; through voice, electronic, and written messages; project cycle and reports and presentations during this cycle; and communications for employment.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management minor; or must be in the Project Management minor. Jointly offered with: ENCE614.
Credit Only Granted for: ENCE424 or ENCE614.

ENCE426 Construction Documentation and BIM Applications in Engineering and Construction (3 Credits)
Learn the basics of construction documentation methods, with particular emphasis on Building Information Modeling (BIM). Topics include: the fundamentals of assembly, coordination, and maintenance of construction documents and implementation of BIM techniques in the design and construction processes, and; a review of Autodesk, Revit, and Navisworks and other leading BIM software. Lectures from project management faculty supplemented by guest lecturers from the construction industry.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering; or must be in the Construction Project Management Minor; or must be in the Project Management Minor.

ENCE431 Hydrologic Engineering (3 Credits)
An introduction to basic principles of hydrologic science including the hydrologic cycle, rainfall, surface runoff and streamflow. Special emphasis is placed on hydrologic engineering design of stormwater management and flood control facilities. Design projects are used to illustrate design practices.
Prerequisite: ENCE305; and permission of ENGR-Civil & Environmental Engineering department.

ENCE432 Ground Water Hydrology (3 Credits)
Concepts related to the development of the ground water resources, hydrology, hydrodynamics of flow through porous media, hydraulics of wells and basin-wide ground water development. Fundamentals of ground water pollution are introduced.
Prerequisite: ENCE305; and permission of ENGR-Civil & Environmental Engineering department.

ENCE441 Foundation Design (3 Credits)
Critical review of classical lateral earth pressure theories, analysis of retaining walls and reinforced earth walls, subsurface explorations, bearing capacity and settlement of shallow foundations, design of deep foundations that includes both pile foundations and drilled shafts.
Prerequisite: ENCE340; and permission of ENGR-Civil & Environmental Engineering department.

ENCE444 Experimental Methods in Geotechnical Structural Engineering (3 Credits)
In the geotechnical engineering part of the course, major soils testing and their interpretation including classification, compaction, strength, and compressibility will be undertaken. The structural engineering part of this course covers test planning, loading apparatus, instrumentation, data acquisition and data analysis, as well as basic aspects of structural testing techniques and shake-table test.
Prerequisite: ENCE353 and ENCE340; and permission of ENGR-Civil & Environmental Engineering department.

ENCE447 Pavement Engineering (3 Credits)
Fundamental principles underlying the design, construction, maintenance and repair, and management of highway and airfield pavement systems. Pavement performance (functional/structural; evaluation); pavement mechanics (multi-layered elastic theory; slab theory); pavement materials (properties and characterization); environmental effects; current rigid and flexible design methods (new/rehabilitation); construction (new construction; maintenance/repair; rehabilitation); economic evaluation; pavement management.
Prerequisite: ENCE340; and permission of ENGR-Civil & Environmental Engineering department.

ENCE453 Computer-Aided Structural Analysis (3 Credits)
Computer-aided analysis of structural systems. Unified matrix formulation of stiffness and flexibility methods. Slope deflection method. Evaluation of truss, frame, and grid systems. Non-prismatic and curved elements. Error analysis and determination of ill-conditions. Introduction to finite element methods; formulation of simple two-dimensional elements. In laboratory, use and development of CAD software.
Prerequisite: ENCE353; and permission of ENGR-Civil & Environmental Engineering department.

ENCE454 Design of Concrete Structures (3 Credits)
Combined bending and compression, development and anchorage of reinforcement, deflections, design of slabs including one-way and two-way, design of footings, retaining walls, introduction to prestressed concrete, design of multi-story buildings.
Prerequisite: ENCE353; and permission of ENGR-Civil & Environmental Engineering department.
Formerly: ENCE451.

ENCE455 Design of Steel Structures (3 Credits)
Behavior and design of members subjected to fatigue, and combined bending and compression; plate girders, composite beams, open-web joists and connections. Methods of allowable stress design, and load and resistance factor design. Elements of plastic analysis and design. Framing systems and loads for industrial buildings and bridges.
Prerequisite: ENCE353; and permission of ENGR-Civil & Environmental Engineering department.

ENCE466 Design of Civil Engineering Systems (3 Credits)
A major civil engineering design experience that emphasizes development of student creativity, development and use of design methodologies, evaluation of alternate solutions, feasibility considerations, and detailed system descriptions. Realistic design constraints including economic factors, safety, aesthetics, and reliability will be imposed. Students will work in design project groups and be required to exercise oral and written communication skills.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Senior standing.
Additional Information: Must be taken in the semester in which the student graduates.

ENCE470 Highway Engineering (3 Credits)
Highway location and design, highway engineering economics, traffic engineering, traffic measurement devices and technologies. Includes discussion of technological advances in traffic flow and capacity, such as signal systems, corridor control, automatic driver information, incident detection and autonomous vehicle operation.
Prerequisite: ENCE302 and ENCE370; and permission of ENGR-Civil & Environmental Engineering department.

ENCE472 Transportation Engineering (3 Credits)
Transportation engineering concepts including transportation systems analysis, airport systems, airline and airport operations, marine transportation and urban public transportation systems.
Prerequisite: ENCE302 and ENCE370; and permission of ENGR-Civil & Environmental Engineering department.

ENCE488 Senior Thesis (3 Credits)
Advanced study in civil engineering problems with special emphasis on mathematical modeling and experimental methods.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Senior standing.

ENCE489 Special Problems in Civil Engineering (1-4 Credits)
A course arranged to meet the needs of exceptionally well prepared students for study in a particular field of civil engineering.
Prerequisite: Permission of ENGR-Civil & Environmental Engineering department.
Restriction: Senior standing.
Repeatable to: 9 credits if content differs.

ENCE602 Project Procurement Management (3 Credits)
Fundamental concepts and techniques for project acquisition and procurement are presented. Students are introduced to the PMBOK Guide six-step procurement process and expected to develop an in-depth understanding of project evaluation, planning, financing, contracting, negotiation, and procurement execution. It will also cover emerging methods, principles, and practices in infrastructure project procurement, including Public-Private Partnerships, Carbon project procurement, and Clean Development Mechanism.

ENCE603 Data Analytics for Project Managers (3 Credits)
Introduction to identifying, analyzing, assessing, and managing data inherent to engineering projects. Includes: statistical principles, concepts, and models; decision science aspects of data systems; Bayesian methods; measurement theory; subjective aspects of statistics and data appraisal. Examples are drawn from software development, systems integration, and other large engineering projects. Covers statistical basics, subjective probability, Bayesian data analysis, introduction to decision theory, Monte Carlo simulation, value of information, and risk-based decision making from data.
Recommended: ENCE627.

ENCE604 Sustainabilty Fundamentals for Project Managers (3 Credits)
Addresses the fundamentals of sustainability for project managers including best practices of modern sustainable construction and project management. Commercial and residential buildings consume about 40 percent of the energy used in the United States. The course therefore emphasizes the application of the sustainable development goals to the built environment, including the practical operational aspects of sustainable facility project management and sustainable construction by contractors. The course also will cover the fundamental concepts of sustainable project development and the move towards economic prosperity, environmental protection, and social equity, taking all three dimensions into account to achieve sustainability. Project managers need to take responsibility for more sustainable development of organizations, facilities, and projects.

ENCE605 Evolving as a Project Leader (3 Credits)
Projects are now used by many organizations for the implementation of strategic initiatives. This means that project managers must be able to do more than manage, organize, and control. They must be able to lead the project team and its stakeholders through change. This course explores four themes 1) Leadership theory with an emphasis on servant and situational leadership; 2) Vital leadership skills; 3) Project leadership in traditional and agile projects; and, 4) Developing your leadership skills.

ENCE606 Graduate Introduction to Project Scheduling (3 Credits)
Students are taught the basics of project scheduling and the various scheduling approaches that are currently being used in the design and construction industry. Project planning techniques will be covered and basic scheduling methods will be taught including the use of bar charts. Critical Path Method (CPM), Program Evaluation and Review (PERT) and Linear Scheduling (Line of Balance) methods.

ENCE607 Mastering Agile Project Management (3 Credits)
Learn how and why Agile project management is the fastest growing and most successful project management philosophy today. Learn the mechanics of how to design and facilitate projects using pure Agile Scrum and Lean Kanban techniques; The tradeoffs of using hybrid techniques such as Lean Startup, Scaled Agile for the Enterprise, and Disciplined Agile Development. Then go beyond these frameworks to the science beneath with the essential principles to ensure you get the best benefits of Agile project management methods.
Prerequisite: Must have completed or be concurrently enrolled in ENCE662.

ENCE610 Fundamentals of Structural Analysis (3 Credits)
Cartesian tensor notation. Linear forms of the general equilibrium, compatability, and constitutive equations. The calculus of variations. The principles of virtual work and complementary virtual work. Self-adjoint problem formulations.

ENCE611 Finite Element Methods (3 Credits)
Basic principles and fundamental concepts of the finite element method. Consideration of geometric and material nonlinearities, convergence, mesh gradation and computational procedures in analysis. Applications to plane stress and plane strain, plates and shells, eigenvalue problems, axisymmetric stress analysis, and other problems in civil engineering.
Formerly: ENCE661.

ENCE613 Structural Dynamics (3 Credits)
Analysis of the dynamic response of structrues and structural components subjected to impact load, transient load, and ground excitations; study of single degree-of-freedom and multi degree-of-freedom systems in classical closed form solution and approximate numerical solution; solution in the frequency domain and the use of finite element method.
Formerly: ENCE653.

ENCE620 Risk Analysis for Engineering (3 Credits)
Sources of hazards, definition of risk, system analysis, functional modeling and analysis techniques, probabilistic risk assessment procedure, risk methods, risk acceptance, assessment of failure likelihood, consequence assessment, risk benefit assessment, uncertainty surces and types, modeling uncertainty, risk analysis and decision making under uncertainty, collection of data, expert-opinion elicitation, human-machine interface and human factors engineering.

ENCE621 Uncertainty Modeling and Analysis (3 Credits)
Definition of engineering systems, knowledge levels using information science concepts as applied to engineering systems, sources and types of knowledge and ignorance, uncertainty sources and types for engineering systems, probability models, statistical models, fuzziness, fuzzy sets, fuzzy logic, fuzzy arithmetic, imprecise probabilities, evidence methods, uncertainty measures, uncertainty management, uncertainty reduction, applications of these analytical methods to engineering systems and in decision making.
Prerequisite: ENCE302; or students who have taken courses with comparable content may contact the department.

ENCE622 Construction Automation & Robotics (3 Credits)
Covers advanced technologies leading to redesign and partial or full automation of selected construction processes utilizing industrial robotics. Lectures and presentations will cover topics such as basic robotic technology (robot kinematics and dynamics, industrial manipulators, mobility bases, end effectors, sensors, control systems, and robot task programming), design of automated construction processes, selection of means and methods for automated construction processes, robot ergonomics and safety, calculation of costs and benefits of construction robots in selected applications, engineering and economic feasibility of automation and robotics in the construction industry.

ENCE623 Introduction to Advanced Scheduling (3 Credits)
A Combination of lecture and hands-on use of software to develop advanced knowledge and skills necessary to master advanced scheduling techniques for project management and control will be used. No software purchase is necessary.
Prerequisite: ENCE423 or ENCE662.
Credit Only Granted for: ENCE623 or ENCE688S.

ENCE625 Project Administration (3 Credits)
Principles of project administration procedures from the viewpoint of a resident project manager or project engineer on a construction or engineering project. The course specifically addresses the project administration responsibilities of the project manager or project engineer in the engineering, design, or construction industries. Students with a background in the private sector or the government sector will benefit. The course takes a project team approach for improved job efficiency, outlining a project team operation in which the office project administrator delegates to the greatest possible extent all those project administrative functions that can be done more efficiently in the field. The class also addresses the responsibilities and risks that a project administrative manager is likely to encounter. The course is suitable for students, engineering and design professionals, project managers, experienced contract administrators, and owners interested in the special administrative problems of engineering or construction.

ENCE626 Information Technologies for Project Managers (3 Credits)
Introduction to various information technology (IT) and automation-based solutions for project managers in capital project industries, including IT and automation tools for major life-cycle stages of a project: planning, design, fabrication/construction, operation, maintenance, retrofit and demolition/recycling. Both established and experimental approaches and tools will be covered. Building/Product Information Modeling software, sensing devices, field data acquisition and processing for project controls, status reporting, materials and equipment management, environmental monitoring, work-site safety and facility operations and management will be presented and analyzed. Web-based project management software solutions and applications for mobile devices such as tablets and smart phones will be featured in classroom presentations and materials provided to the students. Real project case studies from project-based firms will be used to illustrate the feasibility and usability of the tools presented in class. Students will be expected to acquire hands-on knowledge and experience with selected tools of particular interest in support of their future career paths.
Prerequisite: ENCE662.

ENCE627 Project Risk Management (3 Credits)
Introduction to identifying, analyzing, assessing, and managing risks inherent to engineering projects. Includes: probability modeling, choice and value theory, schedule and cost risk, risk mitigation and transfer, and contract considerations of project risk. Examples are drawn from construction, software development, systems integration, and other large engineering projects; and cover probability basics, subjective probability, statistical data analysis, introduction to decision theory, Monte Carlo simulation, value of information, and risk-based decision making.
Restriction: Must not have completed ENCE627.

ENCE630 Environmental and Water Resource Systems I (3 Credits)
Application of statistical and systems engineering techniques in the analysis of information necessary for the design or characterization of environmental or hydrologic processes; emphasis on the fundamental considerations that control the design of information collection programs, data interpretation, and the evolution of simulation models used to support the decision-making process.

ENCE631 Hydrologic Analysis and Nonpoint Pollution Models (3 Credits)
A detailed analysis of the physical processes controlling the spatial distribution of runoff and constituent transport during rainfall and snowmelt events. Emphasis is on developing an understanding of the processes and translating this understanding into practical models that can be used for runoff simulation, stormwater management, and environmental impact assessment.

ENCE632 Introduction to Infrastructure and Resilience (3 Credits)
Develops system-level skills for the planning, design, maintenance, and operation of resilient infrastructure systems. Through this course, we will discuss a variety of infrastructure systems, both public and private, and their role in communities before and after disasters. The themes of the course will be grounded in the four phases of emergency management (mitigation, preparedness, response, and recovery) and the role that infrastructure plays in each. Through these applications areas, we will study a variety of conceptual, analytical, and computational models that support informed decision-making for these systems under uncertainty.
Prerequisite: ENCE302; and ENCE360. Or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ENCE688U, ENCE632, ENCE489U or ENCE430.
Formerly: ENCE688U.

ENCE633 Assessment of Natural Hazards for Engineering Applications (3 Credits)
Ensuring the resilience of infrastructure and other engineered systems requires an assessment of the natural hazards to which the systems are exposed. Probabilistic natural hazard assessment evaluates how likely a location is to experience hazard events (e.g., hurricanes or earthquakes) and how likely those events are to cause various impacts (e.g., large surges, intense rainfall, high winds, or ground shaking). This course will review the basic science of natural hazards and provide the foundational concepts of probability and statistics required for developing models to assess the frequency and severity of natural hazards. This course will present methodologies for assessment of multiple types of natural hazards (e.g., seismic, precipitation, riverine, coastal, and wind hazards).
Prerequisite: ENCE302. Jointly offered with: ENCE433.
Credit Only Granted for: ENCE633 or ENCE433.

ENCE635 Geographic Information Systems for Watershed Analysis (3 Credits)
Emphasis is on the use of GIS to support the analysis and modeling tasks associated with watershed planning and management. This course familiarizes the student with fundamentals of GIS data models, projections, and coordinate systems. Students develop a set of GIS-based alogrithms solving common engineering problems in hydrology. Internet data sources and GPS technology are also covered.
Credit Only Granted for: ENCE524 or ENCE688Z.
Formerly: ENCE688Z.

ENCE637 Biological Principles of Environmental Engineering (3 Credits)
An examination of biological principles directly affecting man and his environment, with particular emphasis on microbiological interactions in environmental engineering related to air, water and land systems; microbiology and biochemistry of aerobic and anaerobic treatment processes for aqueous wastes.

ENCE640 Advanced Soil Mechanics (3 Credits)
Introduction to the use of elastic theory in stress and displacement solutions to geotechnical engineering (soil and rock mechanics). The effect of soil moisture (at rest) relative to effective stress principles, capillary and frost. Exact and numeric techniques for the analysis for soil seepage under isotropic and anisotropic conditions. Classical settlement (consolidation) and compressiblility theories, including finite difference solution for vertical and radial drainage.
Prerequisite: ENCE340; or students who have taken courses with comparable content may contact the department.

ENCE641 Advanced Foundations Systems (3 Credits)
Review of soil properties and subsurface exploration, evaluation and design of shallow foundations, including settlement and bearing capacity of spread footings and mats. Discussion of methods of soil improvement. Analysis and design of deep foundations including single pile, pile load testing, pile group actions, and drilled shaft foundations for both vertical and horizontal loads. Load and resistance factor design concepts will be presented.
Prerequisite: ENCE340; or students who have taken courses with comparable content may contact the department.

ENCE644 Advanced Pavement and Civil Engineering Materials (3 Credits)
Advanced course in Highway and Civil Engineering Materials. Dynamic Material Characterization. Elastic, Plastic and Viscoelastic Behavior. Energy Analysis. Physical and Mechanical Properties. NDT. Performance: Creep, Fatigue, Durability, other. Recent developments in Aggregate Evaluation, Portland Cement Concrete, High Performance Concrete, Conventional and Modified Asphalt Binders and Mixtures, Polymers & Composites, Geotextiles, Smart and Self Healing Materials, Recycled and Reclaimed Materials.
Prerequisite: ENCE300.
Credit Only Granted for: ENCE644 or ENCE688P.
Formerly: ENCE688P.

ENCE645 Geotechnics of Waste Disposal (3 Credits)
Fundamental aspects of geotechnical engineering that apply to problems of waste containment and remediation, basic principles of containment systems, compacted clay liners and clay mineralogy, hydraulic conductivity of compacted soils, methods of laboratory and field hydraulic conductivity measurements, design of waste containment systems, landfill stability and settlement, geosynthetic liners, waste compatibility, contaminant transport through liners, leachate collection systems, gas collection systems, covers and caps.
Credit Only Granted for: ENCE489X, ENCE645, or ENCE688X.
Formerly: ENCE688X.

ENCE647 Slope Stability and Seepage (3 Credits)
Theoretical and practical aspects of seepage effects, and groundwater flow, review of shear strength principles, flow through porous media, hydraulic conductivity, flow nets, determination of water pressure, seepage forces and quantity of seepage, laboratory and field tests for shear strength, infinite slopes, block analysis, method of slices, seismic analysis of slopes, effective and total stress analysis, computer program for slope stability analysis, slope stability problems in waste disposal, construction excavations, reinforced embankments, embankments on soft ground.
Prerequisite: ENCE340.
Credit Only Granted for: ENCE489A, ENCE647, or ENCE688A.
Formerly: ENCE688A.

ENCE650 Process Dynamics in Environmental Systems (3 Credits)
The fundamentals of heterogeneous equilibria, rates of environmental reactions, and flow and material transport or presented. Applications of these principles will be presented to small and large scale environmental problems involving liquid, gas, and solid phases. Both natural and engineered environmental systems will be examined.
Formerly: ENCE636.

ENCE651 Chemistry of Natural Waters (3 Credits)
Application of principles from chemical thermodynamics and kinetics to the study and interpretation of the chemical composition of natural waters is rationalized by considering metal ion solubility controls, pH, carbonate equilibria, adsorption reactions, redox reactions and the kinetics of oxygenation reactions which occur in natural water environments.
Credit Only Granted for: ENCE633 or ENCE651.
Formerly: ENCE633.

ENCE652 Microbiological Principles of Environmental Engineering (3 Credits)
An examination of microbiological principles directly affecting humans and the surrounding environment. Special emphasis is given to the understanding of microbial physiology and in environmental engineering related to water and land systems including aerobic and anaerobic treatment processes involved in nutrient/waste recycling as well as impact of xenobiotic compounds on processes water, soil and sediment.
Credit Only Granted for: ENCE637 or ENCE652.
Formerly: ENCE637.

ENCE655 Environmental Behavior of Organic Pollutants (3 Credits)
Introduction to the scientific data needed and methods currently available to assess the environmental risk of organic chemicals. Applications of principles from chemical thermodynamics will be used to study phase-transfer processes of organic pollutants in the environment (solid/water, solid/air, water/air). Physical-chemical properties of organic pollutants will be used to estimate partitioning.
Prerequisite: ENCE651.

ENCE660 Principles of Disaster Management (3 Credits)
Covers the complexities and unique requirements that arise in preparing for, responding to, recovering from and mitigating against natural disasters. It focuses on what the Manager should know to handle pre- and post-disaster projects. The course introduces underlying policies, programs and emergency management protocols related to managing natural disasters. It translates the lexicons of emergency management to align with project management tools and processes. The course also explores the challenges of executing and delivering projects and programs during each phase of the emergency management cycle. The student will learn to build disaster-resilient concepts and emergency management into project management processes and be better equipped to contribute to a more sustainable and disaster-resilience future.

ENCE661 Project Cost Accounting and Finance (3 Credits)
This course reviews the fundamentals of accounting; examines project cost accounting principles, applications, and impact on profitability; examines the principles of activity based costing; covers the elements involved in cash management; introduces the framework for how projects are financed and the potential impact financing has on the projects; and a framework for evaluating PC based systems and what resources are needed for an effective project cost system.

ENCE662 Introduction to Project Management (3 Credits)
Introduction to project management including: overview and concepts of project management (principles, body of knowledge, strategies); planning successful projects (defining, specifying, delivery options, scheduling, budgeting); implementing (organizing the team, work assignments, team building, effective leadership); executing (performance measurement, maintaining the schedule, adjustments/mid-course corrections, record keeping, status reporting, communications, managing conflict, time management); and closeout(performance measurement, maintaining the schedule, adjustments/mid-course corrections, record keeping, status reporting, communications, managing conflict, time management).

ENCE664 Legal Aspects of Engineering Design and Construction (3 Credits)
Examines ways in which the legal system affects the design and construction process. Focuses on contract types and the relationships between the parties in different delivery systems. Covers basics of procurement protocols along with negotiating techniques and strategies. Topics include contract law, the relationships between the parties, tort and negligence law, and the statutory principles affecting construction.

ENCE665 Management of Project Teams (3 Credits)
Experience has shown that really excellent project managers are not only technically competent but that they have above average skills in human relations and communications. The course will prepare project managers to optimize the utilization of their most important resource: people. Relying primarily on a wide range of research and experience in the Project Team, this course will help guide project managers in building the other skills needed to be truly successful in the competitive Project Team.

ENCE666 Cost Engineering and Control (3 Credits)
Analytical techniques to estimate and control project costs, including site investigation, quantity takeoff, work analysis, and bid preparation. Systematic cost control as related to job production and historical data. Includes the fundamentals of different types of cost estimating, the appropriate use of each, and examination of popular software. This course is designed to help students develop the ability to utilize techniques of cost estimating, cost and schedule control and project management as they apply to engineering and construction work. Students will understand why it is crucial to understand the various types of cost estimating and the appropriate use of each, activity-based costing, conceptual estimating and budgeting, unit cost estimating, parametric estimating, detailed estimating, learning curves and progress functions.

ENCE670 Highway Traffic Characteristics and Measurements (3 Credits)
The study of the fundamental traits and behavior patterns of road users and their vehicles in traffic. The basic characteristics of the pedestrian, the driver, the vehicle, traffic volume and speed, stream flow and intersection operation, parking, and accidents.
Prerequisite: ENCE470; or permission of instructor.

ENCE672 Regional Transportation Planning (3 Credits)
Factors involved and the components of the process for planning statewide and regional transportation systems, encompassing all modes. Transportation planning studies, statewide traffic models, investment models, programming and scheduling.

ENCE673 Urban Transportation (3 Credits)
The contempory methodology of urban transportation planning. The urban transportation planning process, interdependence between the urban transportation system and the activity system, urban travel demand models, evaluation of urban transportation alternatives and their implementation.

ENCE674 Urban Transit Planning and Rail Transportation Engineering (3 Credits)
Basic engineering components of conventional and high speed railroads and of air cushion and other high speed new technology. The study of urban rail and bus transit. The characteristics of the vehicle, the supporting way, and the terminal requirements will be evaluated with respect to system performance, capacity, cost, and level of service.

ENCE675 Airport Planning and Design (3 Credits)
The planning and design of airports including site selection, runway configuration, geometric and structural design of the landing area, and terminal facilities. Methods of financing airports, estimates of aeronautical demand, air traffic control, and airport lighting are also studied.

ENCE676 Highway Traffic Flow Theory (3 Credits)
An examination of physical and statistical laws that are used to represent traffic flow phenomena. Deterministic models including heat flow, fluid flow, and energy-momentum analogies, car following models, and acceleration noise. Stochastic approaches using independent and Markov processes, Queuing models, and probability distributions.

ENCE677 OR Models for Transportation Systems Analysis (3 Credits)
Fundamental skills and concepts of the quantitative techniques of operations research including: mathematical modeling, linear programming, integer programming, network optimization (shortest paths, minimum spanning trees, minimum cost network flows, maximum flows), heuristics, and basics of probabilistic modeling. Emphasis on the application of these techniques to problems arising in transportation.

ENCE681 Freight Transportation Analysis (3 Credits)
Application of operations research and system analysis methods to freight transportation systems. Cost and output analysis, terminal location, freight transportation demand models, freight transportation network equilibrium models and analytic models for analyzing the operations of rail, motor carrier, water carrier and air cargo systems.

ENCE688 Advanced Topics in Civil Engineering (1-3 Credits)
Advanced topics selected by the faculty from the current literature of civil engineering to suit the needs and background of students. May be taken for repeated credit when identified by topic title.

ENCE689 Seminar (1-16 Credits)

ENCE710 Steel Structures I (3 Credits)
Moment connections of beams and columns. Wind bracing connections. Plate girders. Floor systems for buildings. Strengthening of beams and trusses. Corrosion control. Fatigue and fracture.
Formerly: ENCE656.

ENCE713 Concrete Structures I (3 Credits)
The behavior and strength of reinforced concrete members under combined loadings, including the effects of creep, shrinkage and temperature. Mechanisms of shear resistance and design procedures for bond, shear and diagonal tension. Elastic and ultimate strength analysis and design of slabs. Columns in multistory frames. Applications to reinforced concrete structures.
Formerly: ENCE753.

ENCE715 Earthquake Engineering (3 Credits)
Review of SDOF and MDOF structural dynamics; characteristics of earthquakes; philosophies of seismic design; elastic and inelastic response spectra; design for ductility; principles of capacity design; design of structural systems requiring special performance criteria.
Restriction: Permission of instructor.
Formerly: ENCE755.

ENCE717 Bridge Structures (3 Credits)
The design and rating of bridge structures in accordance with the AASHTO WSD, LFD, ALFD, and LRFD specifications. Development of the basic strength and performance requirements as defined within AASHTO, area and various foreign codes. Projects requiring the design, rating and ultimate strength evaluations will be assigned for all of the predominate construction types including: simple and continuous span, straight and horizontally curved, non-composite and composite w and box section superstructure elements.
Formerly: ENCE751.

ENCE718 Advanced Structural Systems (3 Credits)
Review of classical determinate and indeterminate analysis technique; multistory buildings; space structures; suspension bridges and cables structures; arches; long span bridges.
Formerly: ENCE750.

ENCE721 Investment Theory for Project Engineers (3 Credits)
An introductory course covering investment theory and its application to project evaluation and selection. Selected topics include: basic theory of interest and fixed income securities; portfolio selection and modification; capital asset pricing; asset price dynamics; derivative securities; and project evaluation using real options.
Credit Only Granted for: ENCE652 or ENCE721.
Formerly: ENCE652.

ENCE722 Market, Spatial, and Traffic Equilibrium Models in Project Management (3 Credits)
Introduction to equilibrium models involving economics and engineering. Topics include: review of relevent optimization theory; the nonlinear complementary problem (NCP) and variational inequality problem formats to solve equilibrium problems; review of relevant game theory, equilibrium models, and algorithims.
Credit Only Granted for: ENCE654, ENCE688M, or ENCE722.
Formerly: ENCE654.

ENCE725 Probabilistic Optimization (3 Credits)
Provide an introduction to optimization under uncertainty. Chance-constrained programming, reliability programming, value of information, two stage problems with recourse, decomposition methods, nonlinear and linear programming theory, probability theory. The objectives of this course are to provide understanding for studying problems that involve optimization under uncertainty, learn about various stochastic programming formulations (chance constrained programs, two stage methods with recourse, etc.) relevant to engineering and economic settings, present theory for solutions to such problems, and present algorithms to solve these problems.Cross-listed with ENME725.
Credit Only Granted for: ENME725 or ENCE725.

ENCE730 Environmental and Water Resource Systems II (3 Credits)
Advanced topics in operational research. Applications to complex environmental and water resource systems. The use of systems simulation and probabalistic modeling.
Prerequisite: ENCE630; or permission of instructor.

ENCE741 Earth Retaining Structures (3 Credits)
Introduction to types and uses of earth retaining structures, and lateral earth pressure concepts and theories. Analysis and design of retaining walls and shoring structures and their bracing systems. These include conventional retaining walls, mechanically stabilized earth walls, cantilever and anchored sheet piling, cellular cofferdams, braced cuts, soil nailing, and the design of tiebacks and anchors. Load and resistance factor design concept will be presented.

ENCE743 Soil Dynamics and Earthquake Engineering (3 Credits)
Review of theory of vibration and wave propagation in elastic media. Field and laboratory methods for determining dynamic soil properties. Analysis and design of soil-foundation systems subjected to machinery generated vibrations and methods of foundation isolation. Earthquake causes, magnitude and intensity, seismic hazard evaluation, NEHRP site classification, site response analyses and ground motion amplification, liquefaction and response of earth structures.
Credit Only Granted for: ENCE642 or ENCE743.
Formerly: ENCE642.

ENCE744 QA/QC and Specification for Highway Materials (3 Credits)
Factorial Experiments and Analysis. Materials Variability Components: Inherent and Testing Variability. Quality Control/Quality Assurance: Analysis Methods, Assurance Plans and Components. Specifications for Asphalt and Concrete Materials: Method, End-Result, Performance Based. Life Cycle Analysis and Performance Modeling Techniques. Use of Advanced Statistical Analysis for Material Properties Monitoring and Performance Predictions: ANOVA, Time Series, Spatial Data Analysis. Advanced Highway Materials including Polymer Modified and High Performance Asphalt and Concrete.
Prerequisite: ENCE300.

ENCE751 Chemistry of Natural Waters II (3 Credits)
A continuation of ENCE651, introducing aquatic chemical kinetics and chemistry of the solid-water interface.
Prerequisite: ENCE650 and ENCE651.

ENCE799 Master's Thesis Research (1-6 Credits)

ENCE898 Pre-Candidacy Research (1-8 Credits)

ENCE899 Doctoral Dissertation Research (1-8 Credits)

ENCH - Engineering, Chemical

ENCH608 Research in Chemical Engineering (1 Credit)
Students gain experience in research through lab rotations and experience presenting their findings.
Restriction: Must be in the Chemical Engineering Doctoral or Master of Science program.
Repeatable to: 8 credits.

ENCH609 Graduate Seminar (1 Credit)
Seminar in Chemical and Biomolecular Engineering
Repeatable to: 4 credits.

ENCH610 Chemical Engineering Thermodynamics (3 Credits)
Advanced application of the general thermodynamic methods to chemical engineering problems. First and second law consequences; estimation and correlation of thermodynamic properties; phase and chemical reaction equilibria.
Prerequisite: CHBE301; and CHBE302. Or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH610 or CHBE610.
Formerly: ENCH610.

ENCH620 Methods of Engineering Analysis (3 Credits)
Application of selected mathematical techniques to the analysis and solution of engineering problems; included are the applications of matrices, vectors, tensors, differential equations, integral transforms, and probability methods to such problems as unsteady heat transfer, transient phenomena in mass transfer operations, stagewise processes, chemical reactors, process control, and nuclear reactor physics.
Prerequisite: MATH246 and CHBE250; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ENCH620 or CHBE620.
Formerly: ENCH620.

ENCH630 Transport Phenomena (3 Credits)
Heat, mass and momentum transfer theory from the viewpoint of the basic transport equations. Steady and unsteady state; laminar and turbulent flow; boundary layer theory, mechanics of turbulent transport; with specific application to complex chemical engineering situations.
Prerequisite: CHBE422; and ENCH424. Or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH630 or CHBE630.
Formerly: ENCH630.

ENCH640 Advanced Chemical Reaction Kinetics (3 Credits)
The theory and application of chemical reaction kinetics to reactor design. Reaction rate theory; homogeneous batch and flow reactors; fundamentals of catalysis; design of heterogeneous flow reactors.
Prerequisite: CHBE440; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department.
Credit Only Granted for: ENCH640 or CHBE640.
Formerly: ENCH640.

ENCH648 Special Problems in Chemical Engineering (1-16 Credits)

ENCH672 Control of Air Pollution Sources (3 Credits)
Sources and effects of air pollutants, regulatory trends, atmospheric dispersion models, fundamentals of two-phase flow as applied to air pollution and air pollution control systems, design of systems for control of gases and particulate matter.
Restriction: Permission of ENGR-Chemical & Biomolecular Engineering department. Jointly offered with: CHBE472.
Credit Only Granted for: CHBE472, CHBE672 or ENCH672.
Formerly: ENCH672.

ENCH686 Advanced Heterogeneous Catalysis for Energy Applications (3 Credits)
Introduction to heterogeneous catalytic science and technology for energy conversion and hydocarbon processing. Preparation and mechanistic characterization of catalyst systems, kinetics of catalyzed reactions, adsorption and diffusion influences in heterogenious reactions. An overview of heterogeneous catalysis in various energy-related applications, including petroleum refining, chemicals from biomass, valorization of shale gas, and CO2 utilization will be introduced.
Prerequisite: Minimum grade of C- in CHBE302, CHBE424, and CHBE440; and permission of instructor.
Restriction: Permission of instructor. Jointly offered with: CHBE486.
Credit Only Granted for: CHBE486, ENCH686 or CHBE686.
Formerly: ENCH686.

ENCH739 Modern Computing Techniques in Process Engineering (3 Credits)
Presentation of recent developments in computing techniques in the context of chemical engineering problems. Symbolic computation and artificial intelligence, neural networks, data filtering and statistical treatment of data.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENCH751 Turbulent and Multiphase Transport Phenomena (3 Credits)
Basic equations and statistical theories for transport of heat, mass, and momentum in turbulent fluids with applications to processing equipment. Fundamental equations of multiphase flow for dilute systems with applications to particles, drops and bubbles. Current approaches for analysis of concentrated suspensions including deterministic models and population balance approaches.
Prerequisite: ENCH620 and ENCH630.

ENCH781 Polymer Reaction Engineering (3 Credits)
Advanced topics in polymerization kinetics, reactor design and analysis; addition and step-growth polymerization; homogeneous and heterogeneous polymerization; photopolymerization; reactor dynamics; optimal operation and control of industrial polymerization reactors.
Prerequisite: ENCH640; or permission of instructor.
Credit Only Granted for: ENCH781 or CHBE690.
Formerly: ENCH781.

ENCH799 Master's Thesis Research (1-6 Credits)

ENCH818 Advanced Topics in Thermodynamics (3 Credits)
Second semester.

ENCH828 Advanced Topics in Chemical Reaction Systems (3 Credits)
First semester. Offered in alternate years.
Prerequisite: ENCH640.

ENCH838 Advanced Topics in Transfer Theory (3 Credits)
First semester. Offered in alternate years.

ENCH858 Advanced Topics in Process Control (3 Credits)
Advanced topics in chemical process control -- robust control, model based process control, process sensing, fault detection, expert systems, neural networks, and integration of design and control.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENCH859 Advanced Topics in Biochemical Systems (3 Credits)
Presentation of techniques for characterizing and manipulating non-linear biochemical reaction networks. Methods are applied to current biotechnological systems, some include: recombinant bacteria; plant, insect and mammalian cells; and transformed cell lines.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENCH868 Advanced Topics of Process Design (3 Credits)
Advanced topics in chemical process analysis and design; construction of process models, steady-state and dynamic simulation, process synthesis, heat-exchanger networks, separation systems, chemical reaction systems, and bioprocesses.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENCH869 Advanced Computer-Aided Process Engineering (3 Credits)
Advanced topics and projects involving modern computing techniques in chemical and process engineering. Topics include but not restricted to advanced process simulation; parallel computation; symbolic, Boolean, and algebraic computation in process modelling; molecular-based modelling; connectionist systems.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENCH898 Pre-Candidacy Research (1-8 Credits)

ENCH899 Doctoral Dissertation Research (1-8 Credits)

ENEE - Electrical & Computer Engineering

ENEE407 Design & Testing of RF and Microwave Devices (2 Credits)
An introduction to state of the art design, and testing techniques of RF and microwave devices. Designs, simulations and layout of different devices are performed using the software package ADS (Advanced Design System). The course highlights a wide range of engineering applications including terrestrial microwave links, satellite communications, broadcasting, mobile communications and radar.
Prerequisite: Minimum grade of C- in ENEE381; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical) ; and permission of ENGR-Electrical & Computer Engineering department.

ENEE408 Capstone Design Project (3 Credits)
Culmination of prior course work in electrical and computer engineering. Utilization of modern design tools and methodologies for the design of components or systems under realistic constraints, with particular emphasis on teamwork and oral/written communication. Areas in which projects are currently offered include: microprocessor-based systems, digital systems, VLSI design (both digital and mixed-signal), and optical systems.
Prerequisite: Must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Repeatable to: 6 credits if content differs.

ENEE411 Advanced Analog and Digital Electronics (3 Credits)
Examination of analog and digital device models for analysis, design, and simulation of transistor level electronic circuits, emphasizing Metal Oxide Silicon Field Effect Transistors (MOSFETs); fundamental single transistor configurations; frequency response, feedback, and stability of multi-transistor circuits, such as current mirrors, differential amplifiers, voltage references, operational amplifiers and data converters; complementary Metal Oxide Silicon (CMOS) implementations of static and clocked digital as well as mixed signal circuits.
Prerequisite: Minimum grade of C- in ENEE303.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer) ; and must have permission of the department.
Credit Only Granted for: ENEE411 or ENEE419A.
Formerly: ENEE419A.

ENEE413 Advanced Electronic Devices (3 Credits)
Advanced devices and their physical operation, providing a thorough description of those parts not usually covered in introductory electronics courses. These include Schottky and tunnel junctions, negative resistance devices used in wireless communication, homo-structure compound semiconductor transistors, hetero-structure (quantum effect) transistors, non-volatile memory devices, photonic devices such as LEDs and solid-state lasers, solar cells, photo-detectors and camera imagers, as well as bio-related components. Special consideration will be given to achieve an understanding of noise processes that limit electronic device performance. In all cases, system-level applications will be illustrated.
Prerequisite: Minimum grade of C- in ENEE303.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical) ; and permission of ENGR-Electrical & Computer Engineering department.
Credit Only Granted for: ENEE413 or ENEE480.
Formerly: ENEE480.

ENEE416 Integrated Circuit Fabrication Laboratory (3 Credits)
Characterization of wafers and fabrication steps. Oxide growth, lithography, dopant diffusion, and metal deposition and patterning will be discussed in the lectures and carried out in the lab in fabricating NMOS transistor circuits. The transistor characteristics will be measured and related to the fabrication parameters.
Prerequisite: Minimum grade of C- in ENEE303; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Formerly: ENEE419J.

ENEE417 Microelectronics Design Laboratory (2 Credits)
Students design and build fairly sophisticated circuits, mainly composed of discrete transistors and integrated circuits. Many of the projects are designed to require that students synthesize from what they have learned in many of the disciplines in electrical engineering. Students learn they can actually use their knowledge to build something very practical, which may include a high-fidelity amplifier, a radio, a memory cell, a transmitter, etc.
Prerequisite: Minimum grade of C- in ENEE303; and minimum grade of C- in ENEE307; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).

ENEE419 Topics in Microelectronics (1-3 Credits)
Selected topics of current importance in microelectronics.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).
Repeatable to: 99 credits if content differs.

ENEE420 Communication Systems (3 Credits)
Fourier series, Fourier transforms and linear system analysis; random signals, autocorrelation functions and power spectral densities; analog communication systems: amplitude modulation, single-sideband modulation, frequency and phase modulation, sampling theorem and pulse-amplitude modulation; digital communication systems pulse-code modulation, phase-shift keying, differential phase shift keying, frequency shift keying; performance of analog and digital communication systems in the presence of noise.
Prerequisite: ENEE324; and completion of all lower-division technical courses in the EE curriculum.

ENEE425 Digital Signal Processing (3 Credits)
Sampling as a modulation process; aliasing; the sampling theorem; the Z-transform and discrete-time system analysis; direct and computer-aided design of recursive and nonrecursive digital filters; the Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT); digital filtering using the FFT; analog-to-digital and digital-to analog conversion; effects of quantization and finite-word-length arithmetic.
Prerequisite: ENEE322; and completion of all lower-division technical courses in the EE curriculum.

ENEE426 Communication Networks (3 Credits)
The main design issues associated with computer networks, satellite systems, radio nets, and general communication networks. Application of analytical tools of queuing theory to design problems in such networks. Review of proposed architectures and protocols.
Prerequisite: ENEE324; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in Engineering: Electrical program.

ENEE428 Communications Design Laboratory (2 Credits)
EE capstone design course. Exploring the signal processing and communication systems theoretical concepts presented in ENEE 420 Communication Systems and ENEE 425 Digital Signal Processing by implementing them on actual DSP based hardware in real time.
Prerequisite: ENEE324; and completion of all lower-division technical courses in the EE curriculum.
Corequisite: ENEE425 or ENEE420.
Restriction: Must be in Engineering: Electrical program.

ENEE429 Topics in Communications (1-3 Credits)
Selected topics of current importance in communications.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).
Repeatable to: 99 credits if content differs.

ENEE436 Foundations of Machine Learning (3 Credits)
A broad introduction to the foundations of Machine Learning (ML), as well as hands-on experience in applying ML algorithms to real-world data sets. Topics include various techniques in supervised and unsupervised learning, as well as applications to computer vision, data mining, and speech recognition.
Prerequisite: 1 course with a minimum grade of C- from (ENEE324, STAT400); and 1 course with a minimum grade of C- from (ENEE150, CMSC216); and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Permission of ENGR-Electrical & Computer Engineering department. And must be in one of the following programs (Engineering: Electrical; Engineering: Computer) ; or must be in the ECE Department's Machine Learning notation program.
Credit Only Granted for: ENEE436, ENEE439M, or CMSC422.
Formerly: ENEE439M.

ENEE439 Topics in Signal Processing (1-3 Credits)
Selected topics of current importance in signal processing.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Repeatable to: 99 credits if content differs.

ENEE440 Microprocessors (3 Credits)
Microprocessor architectures, instruction sets, and applications. Bus structures, memory, I/O interfacing. Assembly language programming, LSI device configuration, and the embedding of microprocessors in systems.
Prerequisite: ENEE350; and completion of all lower division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).

ENEE445 Computer Laboratory (2 Credits)
This laboratory course focuses on the hardware/software interface in computer systems. Hands-on experiments are used to teach design, construction, analysis, and measurement of both hardware and software for embedded systems. Projects emphasize using microcontrollers for control, sensing, and communication through various I/O devices.
Prerequisite: Minimum grade of C- in ENEE205; or minimum grade of C- in ENEE206; and minimum grade of C- in ENEE350; and must have earned a minimum grade of C- in all 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).

ENEE446 Digital Computer Design (3 Credits)
Hardware design of digital computers. Arithmetic and logic units, adders, multipliers and dividers. Floating-point arithmetic units. Bus and register structures. Control units, both hardwired and microprogrammed. Index registers, stacks, and other addressing schemes. Interrupts, DMA and interfacing.
Prerequisite: ENEE350; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Permission of ENGR-Electrical & Computer Engineering department.
Credit Only Granted for: ENEE446 or CMSC411.

ENEE447 Operating Systems (4 Credits)
The course will present the theory, design, implementation and analysis of computer operating systems. Through classroom lectures, homework, and projects, students learn the fundamentals of concurrency, process management, interprocess communication and synchronization, job scheduling algorithms, memory management, input-output devices, file systems, and protection and security in operating systems. Optional topics may include communications protocols, computer security, and real-time operating systems. The lectures will be complemented with a significant level of programming, bringing up a simple operating system from scratch, concurrently as the topics are discussed in lecture. A weekly recitation section will provide TA support and an informal laboratory atmosphere. Each student will have their own board, so development will be done largely outside the classroom at each student's pace.
Prerequisite: 1 course with a minimum grade of C- from (CMSC414, CMSC417, CMSC420, CMSC430, CMSC433, CMSC435, ENEE440, ENEE457); and permission of ENGR-Electrical & Computer Engineering department; and (ENEE350, CMSC330, and CMSC351).
Restriction: Must be in Engineering: Computer program; and permission of ENGR-Electrical & Computer Engineering department.
Credit Only Granted for: ENEE447, CMSC412, or ENEE459S.
Formerly: ENEE459S.

ENEE456 Cryptography (3 Credits)
The theory, application, and implementation of mathematical techniques used to secure modern communications. Topics include symmetric and public-key encryption, message integrity, hash functions, block-cipher design and analysis, number theory, and digital signatures.
Prerequisite: (CMSC106, CMSC131, or ENEE150; or equivalent programming experience); and (2 courses from (CMSC330, CMSC351, ENEE324, or ENEE380); or any one of these courses and a 400-level MATH course, or two 400-level MATH courses). Or permission of instructor. Also offered as: CMSC456, MATH456.
Credit Only Granted for: MATH456, CMSC456 or ENEE456.

ENEE457 Computer Systems Security (3 Credits)
Theoretical and practical aspects of computer systems security. Topics covered include symmetric/asymmetric encryption, message authentication, digital signatures, access control, as well as network security, web security and cloud security. Students acquire tools necessary for designing secure computer systems and programs and for defending against malicious threats (e.g., viruses, worms, denial of service).
Prerequisite: Minimum grade of C- in ENEE350; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer) ; and permission of ENGR-Electrical & Computer Engineering department.
Credit Only Granted for: CMSC414, ENEE459C or ENEE457.
Formerly: ENEE459C.

ENEE459 Topics in Computer Engineering (1-3 Credits)
Selected topics of current importance in computer engineering.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Repeatable to: 99 credits if content differs.

ENEE460 Control Systems (3 Credits)
Mathematical models for control system components. Transform and time domain methods for linear control systems. Introductory stability theory. Root locus, bode diagrams and Nyquist plots. Design specifications in the time and frequency domains. Compensation design in the time and frequency domain. Introduction to sampled data systems.
Prerequisite: ENEE322; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in Engineering: Electrical program.

ENEE461 Control Systems Laboratory (3 Credits)
Students will design, implement, and test controllers for a variety of systems. This will enhance their understanding of feedback control and familiarize them with the characteristics and limitations of real control devices. They will also complete a small project. This will entail writing a proposal, purchasing parts for their controller, building the system, testing it, and writing a final report describing what they have done.
Prerequisite: Minimum grade of C- in ENEE205; and minimum grade of C- in ENEE322; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Credit Only Granted for: ENEE461, ENME461, or ENME489N.

ENEE463 Digital Control Systems (3 Credits)
Introduction to techniques for the analysis and design of linear control systems and implementation of control systems using digital technology. Topics include linearization, solution of linear equations, z-transforms and Laplace transforms, design of linear controllers, optimal control, and digital implementation of control designs. Students will use MATLAB for the solution of problems and the design of control systems.
Prerequisite: ENEE322; and completion of lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).
Formerly: ENEE469E.

ENEE467 Robotics Project Laboratory (3 Credits)
Teaches practical skills to build, control, and deploy robotic systems. Interdisciplinary groups of students develop real-world robotic systems, with emphasis on making a real robot do what one wants it to do.
Prerequisite: ENAE450 or (ENEE322 and a course which covers academic content similar to that of ENAE450 with approval from the Department of Electrical and Computer Engineering).
Restriction: Must be in the Robotics and Autonomous Systems minor; or permission of Department of Electrical and Computer Engineering.

ENEE469 Topics in Controls (1-3 Credits)
Selected topics of current importance in controls.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Repeatable to: 99 credits if content differs.

ENEE473 Electrical Machines Laboratory (2 Credits)
Experiments involving single and three phase transformers, induction machines, synchronous machines and D.C. machines.
Prerequisite: Minimum grade of C- in ENEE205; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Recommended: ENEE322.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).

ENEE474 Power Systems (3 Credits)
Interconnected power systems, transmission lines, load flow studies, unit commitment and economic dispatch. Three phase networks, machine models. Symmetrical components, fault analysis and unbalanced operation. Power system transients, stability and numerical methods in power system analysis.
Prerequisite: ENEE322; and completion of all lower-division technical courses in the EE curriculum.

ENEE475 Power Electronics (3 Credits)
This course is suitable for undergraduate and graduate students who want to learn the basic principles of power electronics and its applications. Special emphasis is placed on the interdisciplinary nature of power electronics. Strong and intimate connections between power electronics and circuit theory, electronic circuits, semiconductor devices, electric power, magnetic, motor drives and control are stressed.
Prerequisite: Minimum grade of C- in ENEE303; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Electrical; Engineering: Computer).

ENEE476 Renewable Energy (3 Credits)
Solar Energy Conversion Systems: History of Photovoltaic (PV) Systems, PV Cell, Module and Array Models and Equivalent Circuits, Characteristic Resistance, Fill Factor, Effects of Parasitic Resistances, Mismatch Effects, Shading, Bypass Diodes, Sun Tracking Systems, Maximum Power Point Tracking (MPPT) Techniques, Isolated and Non-isolated Switch-mode DC/DC for PV Systems, Inverter Design and Control, Sizing the PV Panel and Battery Pack in PV Applications. Wind Energy Conversion Systems: Introduction to Wind Energy Harvesting, Horizontal and Vertical Wind Systems, Fundamentals of Wind Energy Harvesting Systems, Variable Speed and Fixed Speed Wind Energy Conversion Systems (WECS), Wind Turbines and Different Electrical Machines in Wind Applications, Induction Machine and Dynamic Model of Induction Machines, Synchronous Generators and Dynamic Model of SG, Control of Wind Energy Conversion Systems.
Prerequisite: Minimum grade of C- in ENEE303; and completion of all lower-divisions ENEE courses with a C- or better.
Restriction: Permission of ENGR-Electrical & Computer Engineering department; and must be in one of the following programs (Engineering: Electrical; Engineering: Computer).
Credit Only Granted for: ENEE419R or ENEE476.
Formerly: ENEE419R.

ENEE486 Optoelectronics Lab (2 Credits)
Hands-on experience in performing measurements in optics and electro-optics. Basics of optics, light detectors, Fourier optics, gratings and spectrometers, pulsed dye lasers, fiber optics, electro-optics, and acousto-optics.
Prerequisite: Minimum grade of C- in ENEE205; or minimum grade of C- in ENEE206. And minimum grade of C- in PHYS271 and PHYS270; and must have earned a minimum grade of regular (letter) C- in all required 200-level ENEE courses; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).

ENEE488 Independent Study in Electrical and Computer Engineering (1-3 Credits)
The purpose is to provide students with an opportunity for independent study projects on advanced electrical and computer engineering topics. These projects typically involve academic investigations of technical themes that are not addressed in the established elective and special topics courses taught by the department on a regular basis. Study plans are tailored to students educational goals but are approved and supervised by faculty.
Prerequisite: Must have completed and earned a minimum grade of regular (letter) C- in all lower-division EE or CP tech electives; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Repeatable to: 9 credits if content differs.
Additional Information: A total of 5 credits combined of ENEE488 and ENEE499 can count towards a degree in electrical and computer engineering.

ENEE489 Topics in Electrophysics (1-3 Credits)
Selected topics of current importance in electrophysics.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Repeatable to: 99 credits if content differs.

ENEE490 Physical Principles of Wireless Communications (3 Credits)
Prerequisite: ENEE381.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).
Credit Only Granted for: ENEE490 or ENEE498B.
Formerly: ENEE498B.

ENEE496 Lasers and Electro-optic Devices (3 Credits)
Modern physical optics: Gaussian beams, optical resonators, optical waveguides; theory of laser oscillation, rate equations; common laser systems. Selected modern optoelectronic devices like detectors and modulators. Role of lasers and optoelectronics in modern technology.
Prerequisite: ENEE381; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in one of the following programs (Engineering: Computer; Engineering: Electrical).

ENEE498 Topics in Electrical Engineering (1-3 Credits)
Selected topics of current importance in electrical engineering.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in Engineering: Electrical program.
Repeatable to: 99 credits if content differs.
Formerly: ENEE488.

ENEE499 Senior Projects in Electrical and Computer Engineering (1-5 Credits)
The purpose is to provide students with an opportunity to engage in independent research projects on advanced electrical and computer engineering topics. Projects are selected by students and supervised by faculty and other qualified mentors. While students may be required to acquire new skills or information in the course of completing a 499 project, the focus is to conduct an independent investigation of a technical theme by the student. The project may be used to satisfy the advanced lab requirement if it is approved as a primarily experimental research project. In that case, the student will enroll in ENEE499L.
Prerequisite: Permission of ENGR-Electrical & Computer Engineering department; and completion of all lower-division technical courses in the EE curriculum.
Restriction: Must be in Engineering: Electrical program.
Repeatable to: 9 credits if content differs.
Formerly: ENEE418.
Additional Information: A total of 5 credits combined of ENEE448 and ENEE499 can count toward a degree in electrical or computer engineering.

ENEE600 Solid State Electronics (3 Credits)
Properties of crystals; energy bands: electron transport theory; conductivity and hall effect; statistical distributions; fermi level: impurities; non-equilibrium carrier distributions; normal modes of lattice vibration and thermal properties of crystals; tunneling phenomena; surface properties.
Prerequisite: ENEE413; and must have background in elementary quantum mechanics.
Credit Only Granted for: ENEE600 or ENEE793.
Formerly: ENEE793.

ENEE601 Semiconductor Devices and Technology (3 Credits)
The principles, structures and characteristics of semiconductor devices. Technology and fabrication of semiconductor devices.
Recommended: ENEE413 and ENEE600.
Credit Only Granted for: ENEE601 or ENEE697.
Formerly: ENEE697.

ENEE605 Design and Fabrication of Micro-Electro-Mechanical Systems (MEMS) (3 Credits)
The goals are to explore the world of Micro-Electro-Mechanical Systems (MEMS) by understanding its design and fabrication aspects.
Credit Only Granted for: ENEE605 or ENEE719R.
Formerly: ENEE719R.

ENEE610 Electrical Network Theory (3 Credits)
Matrix algebra, network elements, ports, passivity and activity, geometrical and analytical descriptions of networks, state variable characterizations, scattering matrices, signal flow graphs, sensitivity.
Prerequisite: Must have completed undergraduate-level Circuit Theory; or permission of instructor.

ENEE611 Integrated Circuit Design and Analysis (3 Credits)
Active and passive elements used in semiconductor structures. Design application of linear and digital integrated circuits.
Recommended: ENEE610.
Credit Only Granted for: ENEE611 or ENEE696.
Formerly: ENEE696.

ENEE612 Advanced Power Electronics (3 Credits)
Advanced power electronic converters, techniques to model and control switching circuits, pulse width modulation, resonant switch converters, resonant DC-link converters, series and parallel loaded resonant (SLR, PLR) DC-DC converters, zero voltage switching clamped-voltage (ZVS-CV) converters, ZVS resonant-switch DC-DC converters are explained. In addition, this course deals with small-signal and large-signal modeling and control of switched mode power converters, sliding-mode operation, state space models, generalized state-space averaging, and feedback linearization techniques. Multiple-input converters and their operational principles are explained. Furthermore, practical design procedures for type II and type III compensators with voltage-mode error-amplifier for DC/DC converters are explained.
Prerequisite: ENEE303, ENEE475, or ENEE476; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ENEE719B or ENEE612.
Formerly: ENEE719B.

ENEE614 Radio Frequency VLSI Circuit Design (3 Credits)
This course will give students the knowledge required to analyze, design and lay-out discrete and integrated circuits used in modern radio frequency communications. The course will focus on advanced amplifier concepts, frequency conversion, tuning, and low-noise techniques. Implementation of AM, FM and digital modulation techniques will be covered. Emphasis will be given to CMOS technology as applied to analog VLSI. Advanced applications of SPICE and VLSI design layout tools will be covered.
Recommended: ENEE611.

ENEE620 Random Processes in Communication and Control (3 Credits)
Introduction to random processes: characterization, classification, representation; Gaussian and other examples. Linear operations on random processes, stationary processes: covariance function and spectral density. Linear least square waveform estimating Wiener-Kolmogroff filtering, Kalman-Bucy recursive filtering: function space characterization, non-linear operations on random processes.
Prerequisite: ENEE324; or students who have taken courses with comparable content may contact the department.

ENEE621 Estimation and Detection Theory (3 Credits)
Estimation of unknown parameters, Cramer-Rao lower bound; optimum (map) demodulation; filtering, amplitude and angle modulation, comparison with conventional systems; statistical decision theory Bayes, minimax, Neyman/Pearson, Criteria-68 simple and composite hypotheses; application to coherent and incoherent signal detection; M-ary hypotheses; application to uncoded and coded digital communication systems.
Prerequisite: ENEE620; or students who have taken courses with comparable content may contact the department.

ENEE623 Digital Communications (3 Credits)
Review of sampling and quantization, functional characterization of digital signals and transmission facilities, band-limited signals and systems. Digital modulation/demodulation techniques, error probability, intersymbol interference and its effects, adaptive equalization. Signaling with coded waveforms, fading and satellite channels, multiple access problems and protocols. Introduction to spread-spectrum Communications.
Recommended: ENEE420.

ENEE625 Multi-user Communication (3 Credits)
Basic queueing models. Store-and forward communications networks; switching modes; delay-throughput measures; capacity assignment; routing; topological design; computational aspects; flow control; error control; protocols; specification and validation; local networks; satellite and packet radio systems; multiple access schemes; stability and performance; multi-user information theory; and large scale system theory.
Prerequisite: ENEE620.

ENEE626 Error Correcting Codes (3 Credits)
Introduction to linear codes; bounds on the error correction capabilities of codes; convolutional codes with threshold, sequential and viterbi decoding; cyclic random error correcting codes; P-N sequences; cyclic and convolutional burst error correcting codes.
Prerequisite: ENEE420; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ENEE626 or ENEE722.
Formerly: ENEE722.

ENEE627 Information Theory (3 Credits)
Information measures and their properties; entropy, relative entropy and mutual information. Information source models. Lossless data compression: the Kraft inequality, Shannon-Fano and Huffman codes. Typical sequences, asymptotic equipartition property, lossy source coding. Discrete memoryless channels: capacity, channel coding theorem. The additive Gaussian channel. Source coding under a fidelity constraint: rate distortion function and rate distortion theorem.
Prerequisite: ENEE620.
Credit Only Granted for: ENEE627 or ENEE721.
Formerly: ENEE721.

ENEE630 Advanced Digital Signal Processing (3 Credits)
This is the first-year graduate course in signal processing. The objective is to establish fundamental concepts of signal processing on multirate processing, parametric modeling, linear prediction theory, modern spectral estimation, and high-resolution techniques.
Prerequisite: ENEE425.
Corequisite: ENEE620.
Credit Only Granted for: ENEE624 or ENEE630.
Formerly: ENEE624.

ENEE631 Digital Image and Video Processing (3 Credits)
Foundations of digital image and video processing. Topics covered: 2-D systems and transforms; image acquisition and perception; multi-dimensional sampling; quantization; linear and non-linear techniques for image enhancement and restoration; basics on image analysis; lossless and lossy image compression; motion estimation and compensation; still image and video coding standards; applications of image and video processing.
Prerequisite: ENEE620 and ENEE630; or students who have taken courses with comparable content may contact the department.

ENEE632 Speech and Audio Processing (3 Credits)
The objective is to apply digital signal processing techniques to speech and music signals. Topics covered include acoustic theory of speech production leading to the source-filter model; acoustic and digital vocal-tract models of speech production; speech analysis-synthesis based on the short-time Fourier transform, linear prediction, and homomorphic representations; extensions to other multiresolution analysis; time-domain models for speech processing; auditory perception and speech perception; waveform and model-based speech coding using scalar and vector quantization; time-scale modification; pitch and formant estimation; application of techniques to music analysis-synthesis.
Prerequisite: ENEE620 and ENEE630.
Credit Only Granted for: ENEE739A or ENEE632.
Formerly: ENEE739A.

ENEE633 Statistical Pattern Recognition (3 Credits)
The goal is to introduce mathematical pattern analysis and recognition. Emphasis is given to parametric and non-parametric statistical pattern recognition methods and clustering with applications to speech, image and video recognition.
Prerequisite: MATH461; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Corequisite: ENEE620; or permission of instructor.
Credit Only Granted for: ENEE633 or ENEE739Q.
Formerly: ENEE739Q.

ENEE634 Learning and Statistical Signal Processing (3 Credits)
Adaptive learning and statistical signal processing, including: numerical analysis; principal component analysis and support vector machines; adaptive signal processing (supervised learning); blind equalization and identification (unsupervised learning); antenna array and MIMO signal processing; space-time and space-time-frequency coding; neural networks (nonlinear adaptive learning); advanced topics on machine learning, such as online and deep learning.
Prerequisite: ENEE620 and ENEE630.

ENEE640 Digital CMOS VLSI Design (3 Credits)
Review of MOS transistors: fabrication, layout, characterization; CMOS circuit and logic design: circuit and logic simulation, fully complementary CMOS logic, pseudo-nMOS logic, dynamic CMOS logic, pass-transistor logic, clocking strategies; sub system design: ALUs, multipliers, memories, PLAs; architecture design: datapath, floorplanning, iterative cellular arrays, systolic arrays; VLSI algorithms; chip design and test: full custom design of chips, possible chip fabrication by MOSIS and subsequent chip testing.
Prerequisite: ENEE303 and ENEE350; or students who have taken courses with comparable content may contact the department; or permission of instructor.

ENEE641 Mathematical Foundations for Computer Engineering (3 Credits)
Mathematical modeling, design, analysis and proof techniques related to computer engineering. Probability, logic, combinatorics, set theory, and graph theory, as they pertain to the design and performance of computer engineering systems. Techniques for the design and analysis of efficient computational methods from graph theory and networks. Understanding of the limits on the efficiency of such computational methods. Translation from mathematical theory to actual programming. The course emphasizes mathematical rigor.
Credit Only Granted for: ENEE641 or ENEE759F.
Formerly: ENEE759F.

ENEE644 Computer-Aided Design of Digital Systems (3 Credits)
Design methodologies for digital systems using a modern hardware description language. Algorithmic, architectural and implementation aspects of arithmetic processing elements. Design of Complex Instruction Set (CISC), Reduced Instruction Set (RISC), and floating point processors. Synthesis, simulation and testing of processors with computer-aided design tools. Students in some sections may, on permission, fabricate VLSI chips via MOSIS.

ENEE645 Compilers and Optimization (3 Credits)
The compilation, linking and loading process. Using lexical analyzers and parsers. Intermediate forms. Global, stack and heap objects, and their addressing modes. Stack implementation. Control flow analysis and optimization. Dataflow analysis and optimization including Static, single assignment. Alias analysis.
Prerequisite: ENEE350 or CMSC216; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ENPM808T, ENEE645, or ENPM617.

ENEE646 Digital Computer Design (3 Credits)
Concepts and techniques for design of computer systems with improved performance. Advanced I/O systems, memory organization, pipeland and parallel processors, bus bandwidth, processor/memory interconnections, cache memory, virtual memory, multiprocessors, performance evaluation.
Prerequisite: ENEE446; or students who have taken courses with comparable content may contact the department.

ENEE648 Advanced Topics in Electrical Engineering (3 Credits)
Every semester courses intended for a high degree of specialization are offered by visiting or regular electrical engineering faculty members in two or more of the areas listed in 488. The student should check with the electrical engineering office of graduate studies for a list and the description of the topics offered currently.
Repeatable to: 99 credits if content differs.

ENEE651 Parallel Algorithms (3 Credits)
A presentation of the theory of parallel computers and parallel processing. Models of parallel processing and the relationships between these models. Techniques for the design and analysis of efficient parallel algorithms including parallel prefix, searching, sorting, graph problems, and algebraic problems. Theoretical limits of parallelism.
Prerequisite: CMSC451; or ENEE641; or students who have taken courses with comparable content may contact the department. Jointly offered wit h CMSC751.
Credit Only Granted for: ENEE651, ENEE759K or CMSC751.
Formerly: ENEE759K.

ENEE657 Computer Security (3 Credits)
An introduction to the principles of building secure systems. Topics include operating system (OS) security, secure network communications, software security, real-world attacks, applied cryptography, and hardware security. Within these topics, the course emphasizes the cross-cutting concerns of attacks, defenses and measurement.
Prerequisite: ENEE457 or CMSC414; or students who have taken courses with comparable content may contact the department.

ENEE660 System Theory (3 Credits)
General systems models. State variables and state space. Linearity and its implications. Controllability and observability. State space structure and representation. Realization theory and algorithmic solutions. Parameterizations of linear systems; canonical forms. Basic results from stability theory. Stabilizability. Fine structure of linear multivariable systems; minimal indices and polynomial matrices. Interplay between frequency domain and state space.
Prerequisite: ENEE460 and MATH463; or students who have taken courses with comparable content may contact the department.

ENEE661 Nonlinear Control Systems (3 Credits)
State space methods of stability analysis including second order systems and the phase plane, linearization and stability in the small, stability in the large and Lyapunov's second method. Frequency domain methods including the describing function. Popov's method and functional analytic methods. Introduction to Volterra series representations of nonlinear systems. Applications to conrol system design.
Prerequisite: ENEE660; and (MATH410 or MATH411; or students who have taken courses with comparable content may contact the department). Or permission of instructor.

ENEE662 Convex Optimization (3 Credits)
Focuses on recognizing, solving, and analyzing convex optimization problems. Convex sets, convex functions, convex and quasi-convex optimization problems. Duality theory and optimality conditions. Specific classes of problems including linear optimization (LP), semi-definite optimization (SDP), geometric programming. Algorithms for unconstrained and constrained optimization; interior-point methods. Applications in controls, communications, signal processing, statistics, and other areas.
Recommended: MATH410.
Credit Only Granted for: ENEE759F or ENEE662.

ENEE664 Optimal Control (3 Credits)
General optimization and control problems. Conditions of optimality for unconstrained and constrained optimization problems; sensitivity; duality. Introduction to linear and nonlinear programming methods. Dynamic optimization. Discrete time maximum principle and applications. Pontryagin maximum principle in continuous time. Dynamic programming. Feedback realization of optimal control.
Prerequisite: ENEE660 and MATH410; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Corequisite: MATH411; or permission of instructor.

ENEE680 Fundamentals of Electromagnetics (3 Credits)
Theoretical analysis and engineering applications of Maxwell's equations: boundary value problems of electrostatics and magnetostatics, dielectric and magnetic properties of matter, energy and momentum content of fields, introduction to EM wave propagation.
Prerequisite: ENEE381; or students who have taken courses with comparable content may contact the department.

ENEE681 Electromagnetic Waves and Applications (3 Credits)
Review of Maxwell's equations: potentials, EM energy and momentum, EM plane waves. Properties of waves: dispersion, group velocity, diffraction, the ray optic limit. Waves in media: left-handed media, anisotropic media, wave guides, fibers, cavities. Radiation: antennas, Cherenkov radiation, radiation by accelerated charges, scattering. Additional topics: Wave chaos, Special Relativity.
Prerequisite: ENEE381; or students who have taken courses with comparable content may contact the department.

ENEE686 Charged Particle Dynamics, Electron and Ion Beams (3 Credits)
General principles of single-particle dynamics; mapping of the electric and magnetic fields; equation of motion and methods of solution; production and control of charge particle beams; electron optics; Liouville's theorem; space charge effects in high current beams; design principles of special electron and ion beam devices.

ENEE690 Quantum and Wave Phenomena with Electrical Application (3 Credits)
Introduction of quantum and wave phenomena from electrical engineering point of view. Topics included: general principles of quantum mechanics, operator algebra, the microwave resonant cavity and the analagous potential well problem, harmonic oscillator, hydrogenic atom. Perturbation method applied to the transmission line and potential well problems. Periodically loaded transmission line and Kronig-Penny model of band theory.
Prerequisite: ENEE381; or students who have taken courses with comparable content may contact the department.

ENEE691 Optical Communication Systems (3 Credits)
Optical components and systems. Measures of performance of optical communication systems. Topics include: single and multi-mode optical fibers, DFB and DBR lasers, transmitters and receivers, pin and APD detectors, noise analysis, receiver sensitivity modulation formats, system performance, bit-error-rate, power budget, TDM and WDM systems, network architecture.

ENEE692 Introduction to Photonics (3 Credits)
Introduction to photonic concepts and applications. In particular, high quality factor optical resonators, photonic crystals, microresonators, statistical and photon optics, spontaneous and stimulated emission, semiconductor lasers and detectors, modulators and optical switches are discussed. Finally, the concept of photons and the quantum states of light are presented.
Prerequisite: ENEE380 and ENEE381; or students who have taken courses with comparable content may contact the department.

ENEE698 Graduate Seminar (1-3 Credits)
Every semester regular seminars are held in electrical science and in the six areas of specialization offered by the electrical engineering department. They may be taken, by arrangement with the student's advisor, for repeated credit.
Restriction: Permission of instructor.

ENEE699 Independent Studies in Electrical Engineering (1-3 Credits)
Supervised individual study or project, or supervised group study or project, at an advanced level, in electrical engineering.
Repeatable to: 99 credits if content differs.
Formerly: ENEE609.

ENEE704 Physics and Simulation of Semiconductor Devices (3 Credits)
The physics of electron transport in semiconductor devices will be covered. Numerical methods for attaining solutions to transport equations will be explored. Students will also learn how to use CAD tools fro semiconductor device design. Nano-electronic devices will be introduced.
Recommended: ENEE601 and ENEE600; and exposure to quantum mechanics.
Credit Only Granted for: ENEE694 and ENEE704.
Formerly: ENEE694.

ENEE719 Advanced Topics in Microelectronics (3 Credits)
Repeatable to: 99 credits if content differs.
Formerly: ENEE718.

ENEE729 Advanced Topics in Communication (3 Credits)
Repeatable to: 99 credits if content differs.
Formerly: ENEE728.

ENEE731 Image Understanding (3 Credits)
An advanced graduate level course on image understanding. Mathematical and statistical approaches to solving image understanding problems will be discussed. Topics to be covered include: optimal edge and shape detection; image understanding using Markov random field models; Monte Carlo Markov Chain techniques for image understanding; shape from shading, stereo, texture and contour; structure from motion and object recognition. Existence, uniqueness and convergence issues for many of these problems will be discussed.
Prerequisite: ENEE631 and ENEE633.
Credit Only Granted for: ENEE739J or ENEE731.
Formerly: ENEE739J.

ENEE739 Advanced Topics in Signal Processing (3 Credits)
Repeatable to: 99 credits if content differs.
Formerly: ENEE738.

ENEE749 Advanced Digital Systems Design (3 Credits)
VLSI architecture and algorithms; design strategies; design methodologies; system-level design; area/delay/power trade-offs; high performance systems; multi-chip modules; low-power design; hardware/software co-design; design for testability, design for manufacturability; algorithm, architecture, and component design for adaptive computing systems; prototype system development and test, possible chip fabrication by MOSIS and subsequent chip testing.
Prerequisite: ENEE640 or ENEE644.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

ENEE757 Security in Distributed Systems and Networks (3 Credits)
Threats and countermeasures in centralized and distributed systems; communication security techniques based on encryption; symmetric and asymmetric encryption; encryption modes, including stream and block encryption, and cipher block chaining; message origin and mutual authentication; third-party and inter-realm authentication, authentication of mobile users; data confidentiality and integrity protocols; formal analysis of authentication protocols and message integrity; access control in distributed systems and networks; firewall design; case studies of security mechanisms and policies.
Prerequisite: ENEE647; or permission of instructor.

ENEE759 Advanced Topics in Computer Engineering (3 Credits)
Topics, as announced every semester, from the field of computer engineering and its applications.
Repeatable to: 99 credits if content differs.

ENEE762 Stochastic Control (3 Credits)
Stochastic control systems, numerical methods for the Ricatti equation, the separation principle, control of linear systems with Gaussian signals and quadratic cost, non-linear stochastic control, stochastic stability, introduction to stochastic games.
Prerequisite: ENEE620 and ENEE660; or students who have taken courses with comparable content may contact the department.

ENEE763 Advanced Nonlinear Control Systems (3 Credits)
General introduction to the geometric theory of nonlinear control systems. Theory of decoupling, disturbance rejection, feedback linearization, stability, stabilization, etc.
Prerequisite: ENEE661; or permission of instructor.

ENEE765 Adaptive Control (3 Credits)
General principles of adaptive control. Self-tuning regulators and model reference adaptive systems. Theoretical issues: stability, convergence, and robustness. Practical issues: implementation, computation, auto-tuning, and other successful application. Alternatives to adaptive control.
Prerequisite: ENEE660 and ENEE664; or students who have taken courses with comparable content may contact the department.

ENEE769 Advanced Topics in Controls (3 Credits)
Topics selected, as announced every semester, from the field of controls and its applications.
Repeatable to: 99 credits if content differs.

ENEE789 Advanced Topics in Electrophysics (3 Credits)
Topics selected, as announced every semester, from the field of electrophysics and its applications.
Repeatable to: 99 credits if content differs.
Formerly: ENEE788.

ENEE790 Quantum Electronics I (3 Credits)
Spontaneous emission, interaction of radiation and matter, masers, optical resonators, the gas, solid and semi-conductor lasers, electro-optical effect, propagation in anisotropic media and light modulation.
Prerequisite: Must have knowledge of quantum mechanics; or permission of instructor.

ENEE791 Quantum Electronics II (3 Credits)
Nonlinear optical effects and devices, tunable coherent light sources: optical parametric oscillator; frequency conversion and dye laser. Ultrashort pulse generation and measurement, stimulated raman effect, and applications. Interaction of acoustic and optical waves, and holography.

ENEE798 Advanced Topics in Electrical Engineering (3 Credits)
Topics selected, as announced every semester.
Formerly: ENEE648.

ENEE799 Master's Thesis Research (1-6 Credits)

ENEE889 Teaching Workshop (1 Credit)
Provide training in education for senior PhD students who contemplate an academic career, and give them the opportunity to gain some teaching experience. Emphasis is on issues that are of special importance in electrical and computer engineering education.
Restriction: Must be in ENGR: MS/PhD-Electrical Engineering (Doctoral) program; and permission of ENGR-Electrical & Computer Engineering department.
Repeatable to: 4 credits if content differs.

ENEE898 Pre-Candidacy Research (1-8 Credits)
Provide training in education for senior PhD students who contemplate an academic career, and give them the opportunity to gain some teaching experience. Emphasis is on issues that are of special importance in electrical and computer engineering education.
Restriction: Must be in ENGR: MS/PhD-Electrical Engineering (Doctoral) program; and permission of ENGR-Electrical & Computer Engineering department.
Repeatable to: 4 credits if content differs.

ENEE899 Doctoral Dissertation Research (1-8 Credits)

ENES - Engineering Science

ENES424 Engineering Leadership Capstone (3 Credits)
The work initiated in the Introduction to Engineering Leadership course brings together further exploration of leadership styles and concepts.
Prerequisite: ENES472, ENCE320, and ENES317; and permission of ENGR-A. James Clark School of Engineering.
Recommended: ENES100.

ENES428 Engineering Research for Exchange Students (3-12 Credits)
Directed research within the Clark School of Engineering for international exchange students.
Restriction: Available only to visiting exchange students taking part in an Engineering exchange program.
Repeatable to: 24 credits.

ENES440 Science, Technology and Society: Certificate Program Capstone (3 Credits)
Capstone research seminar for students in the Science, Technology and Society certificate program.
Restriction: Must be in the Science, Technology and Society certificate program; or permission of ENGR-A. James Clark School of Engineering.
Credit Only Granted for: ENES440 or UNIV401.
Formerly: UNIV401.

ENES458 Topics in International Engineering (1-4 Credits)
A variety of topics related to engineering in a global context are discussed including cultural aspects, cross-cultural communication, international standards and law, and engineering and technology issues, business behavior, attitudes and values of selected countries and regions.
Prerequisite: ENES100.
Repeatable to: 12 credits if content differs.

ENES459 Study Abroad Special Topics in Engineering IV (1-6 Credits)
Special topics course in engineering science taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

ENES460 Fundamentals of Technology Start-Up Ventures (3 Credits)
Fundamental aspects of creating, organizing, funding, managing, and growing a technology startup venture. This multidisciplinary course will draw on management, business, legal, financial, as well as technical, concepts. Students form teams and develop a business plan for a technology company, based on each team's own business idea and then present the plan to a panel of outside experts.
Restriction: Permission of ENGR-Maryland Technology Enterprise Institute.
Credit Only Granted for: ENES460, BMGT461, SMLP470 or HLMN470.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES461 Advanced Entrepreneurial Opportunity Analysis in Technology Ventures (3 Credits)
Explores the factors that influence entrepreneurial opportunity analysis in technology-based ventures. Uses a cognitive theoretical framework to examine the integration of motivation, emotions and information processing modes to make complex entrepreneurial decisions in technology venture environments.
Credit Only Granted for: ENES210 or ENES461.

ENES462 Marketing High-Technology Products and Innovations (3 Credits)
Examines the opportunities and challenges of marketing high-technology products in turbulent environments requiring rapid decision making with incomplete information. Explores how innovations are introduced at frequent intervals, research-and-development spending is vital, and there are high mortality rates for both products and businesses.
Restriction: Permission of ENGR-Maryland Technology Enterprise Institute.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES463 Strategies for Managing Innovation (3 Credits)
Emphasizes how the technology entrepreneur can use strategic management of innovation and technology to enhance firm performance. Examines the process of technological change, the ways that firms come up with innovations, the strategies that firms use to benefit from innovation, and the process of formulating technology strategy. Provides frameworks for analyzing key aspects of these industries and teaches students how to apply these frameworks.
Restriction: Permission of ENGR-Maryland Technology Enterprise Institute.
Credit Only Granted for: ENES463, BMGT467, SMLP473 or HLMN472.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES464 International Entrepreneurship and Innovation (3 Credits)
Focuses on the need for every entrepreneur and innovator to understand the global market in today's hypercompetitive world, and to appreciate how to compete effectively in domestic markets by managing international competitors, suppliers, and influences. Explore how the distinction between foreign and domestic markets is becoming less pronounced. Develop skills to identify and manage opportunities on a global basis.
Restriction: Permission of ENGR-Maryland Technology Enterprise Institute.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES466 Leading and Financing the Technology Venture (3 Credits)
Focuses on the challenges of leading and financing new technology ventures. Leadership topics include team selection and formation, aligning rewards with relative contributions of team members, and how early decisions can enable or prevent founders from achieving results that align with their individual motivations for becoming an entrepreneur. Essential tools and methods for building a strong financial foundation for a new technology venture are examined. Includes important accounting principles as well as methods for keeping financial control of the technology venture. Insights are shared on navigating the multitude of financial barriers that may block your entrepreneurial success, as well as how to grow the technology venture from concept through launch.
Restriction: Permission of ENGR-Maryland Technology Enterprise Institute.
Credit Only Granted for: ENES466, BMGT365, SMLP471 or HLMN471.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES467 Engineering for Social Change (3 Credits)
Critical analysis of issues at the intersection of engineering, philanthropy and social change. How engineering design, products and processes have created social change in the past and will do so in the future through both intended and unintended consequences. Topics covered include energy, sustainability and climate change, autonomy, the digital future, low cost engineering, manufacturing, philanthropy, ethics and the impact of electronics on society, among others. Faculty and external experts will engage with students on these topics. Students will broadly engage with organizations involved in using technology for positive social impact.
Restriction: Must not be in Engineering: Mechanical program; and junior standing or higher; and must be in a major in ENGR-A. James Clark School of Engineering. Cross-listed with: ENME467.
Credit Only Granted for: ENES467 or ENME467.

ENES471 Legal Aspects of Entrepreneurship (3 Credits)
Explores critical legal and business issues entrepreneurs face as they build and launch a new venture. Examines real world scenarios, and addresses the legal issues at all of the important junctures along the path to success. Significant attention placed on new venture formation, intellectual property management, and financing arrangements.
Additional Information: Course may not be used to fulfill any BMGT major or minor program requirement.

ENES472 International Business Cultures in Engineering and Technology (3 Credits)
The goal is to provide students with an understanding of cultural aspects pertaining to global business and engineering and develop the cultural understanding, attitudes, and communication skills needed to function appropriately within an increasingly global and multicultural working environment.
Prerequisite: Permission of ENGR-A. James Clark School of Engineering.
Restriction: Sophomore standing or higher.
Credit Only Granted for: ENES472, SLLC471, or SLLC473.

ENES474 Global Perspectives of Engineering (3 Credits)
Faculty supervised research on aspects of engineering in a foreign country including leading fields of research, key world markets, and the culture of the engineering workplace. Students will produce a comprehensive report exhibiting their expertise in their chosen country and the field of engineering within.
Prerequisite: ENES100; or permission of ENGR-A. James Clark School of Engineering.
Restriction: Must be in the International Engineering Minor.
Credit Only Granted for: ENES458M or ENES474.
Formerly: ENES458M.

ENES478 Topics in Engineering Education (1 Credit)
Topics related to teaching engineering courses, particularly project-based courses. Topics can include learning styles, student development theory, multicultural issues in teaching, facilitating team experiences, assessment, and academic integrity.
Restriction: Must be in the Engineering Teaching Fellow program.
Repeatable to: 3 credits if content differs.

ENES480 Engineering Honors Seminar I (1 Credit)
Introduction to engineering leadership, professionalism, and ethics. Discussions of leadership style, elements of success, professional communication, codes of ethics, handling of ethical dilemmas, and the characteristics of a professional.
Restriction: Must be in College of Engineering Honors; and junior standing or higher.

ENES481 Engineering Honors Seminar II (1 Credit)
Introduction to engineering creativity and innovation in engineering. Application of methods of creativity to topics in communication, conducting research, and leadership.
Restriction: Must be in College of Engineering Honors; and junior standing or higher.

ENES489 Special Topics in Engineering (3-6 Credits)
Special topics in engineering.
Prerequisite: Permission of ENGR-A. James Clark School of Engineering.
Repeatable to: 6 credits if content differs.

ENES490 QUEST Capstone Professional Practicum (4 Credits)
The capstone course for the QUEST Honors Program provides students with an opportunity to learn in multidisciplinary teams of business, engineering, and science students in a real-world setting. Companies engage teams of QUEST students with real organizational challenges and dedicate resources to help students address these problems. Student teams must enhance their skills in quality management, process improvement, and systems design and will apply these to add value to a client. In the process, students will improve their teamwork skills.
Prerequisite: ENES390 or BMGT390. Cross-listed with: BMGT490.
Credit Only Granted for: BMGT490 or ENES490.

ENES491 Scoping Experiential Learning Projects (3 Credits)
QUEST students cultivate relationships with new and current corporate partners and prepare project scopes for QUEST's introductory course, BMGT/ENES 190H, and capstone course, BMGT/ENES 490H. Requires independent work communicating with clients and class visits to a variety of potential project sites.
Prerequisite: BMGT190 or ENES190.
Restriction: Restricted to QUEST Program (TQMP) students. Cross-listed with BMGT491.
Credit Only Granted for: BMGT491 or ENES491.

ENES498 Special Topics in Entrepreneurship (3 Credits)
This entrepreneurship seminar and case study-based course will explore technology entrepreneurship with a focus on leadership, marketing, team-building, and management of new technology ventures and assumes baseline knowledge of entrepreneurship. Students will learn skills needed to succeed as a technology entrepreneur and how to apply best practices for planning, launching, and growing new companies. This course is a requirement of the Hinman CEOs program.
Restriction: Must be in Hinman CEOs Program.
Repeatable to: 12 credits if content differs.

ENES499 Senior Projects in Engineering (3 Credits)
Students will work in large teams to solve a multidisciplinary research/design problem. The course will begin with students identifying opportunities, brainstorming project concepts to address these opportunities, applying lean startup and design thinking strategies, and then selecting/proposing a project for the semester. Acceptable projects will require the multidisciplinary design, construction and testing of a project within limited budget and time constraints.
Prerequisite: Permission of ENGR-A. James Clark School of Engineering; and completion of all 1XX and 2xx level (lower-division) technical courses in engineering major with a C- or better.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering.
Repeatable to: 6 credits if content differs.

ENES601 Future Faculty Program Seminar I (1 Credit)
Introduction to and development of skills necessary to obtain and succeed in a university faculty position. Emphasis on technical writing and effective presentations. Discussion of research diversification, networking, ethics and professionalism.
Restriction: Must be in the Clark School Future Faculty Program.

ENES602 Future Faculty Program Seminar II (1 Credit)
Effective teaching techniques. Basic principles of education and learning. Developing a course; promoting active learning, problem solving and critical thinking; designing exam and assignments; and communicating effectively with students.
Restriction: Must be in the Clark School Future Faculty Program.

ENES603 Future Faculty Program Seminar III (1 Credit)
Developing a successful faculty research program. Establishing and maintaining a research group. Finding funding opportunities and writing grant proposals. Mentoring graduate students. Faculty position application process. Preparing research and teaching statements.
Restriction: Must be in the Clark School Future Faculty Program.

ENES604 Future Faculty Program Teaching Practicum (1 Credit)
Graduate students will co-teach a course under supervision of a faculty mentor. Graudate students will be involved in all aspects of the course including development of syllabus, presenting lectures, writing and grading examiniations, and evaluating the students in the course.
Prerequisite: ENES602.
Restriction: Must be a graduate student in the Clark School Future Faculty Program; and students for whom English is not the native language must pass the Maryland English Institute ITA Evaluation prior to enrolling in this course.

ENES658 Special Topics in Engineering in a Global Context (1-3 Credits)
Advanced topics in engineering in a global context.
Restriction: Graduate standing or permission of instructor.
Repeatable to: 12 credits if content differs.

ENES662 Innovative Ideas and Concept Development (3 Credits)
Enables aspiring entrepreneurs to understand the content, methods, and models for new venture opportunity assessment and analysis. Focuses on how to identify and analyze entrepreneurial opportunities for technology-based ventures by first understanding the personal self and decision-making factors. Explores how to evaluate new venture opportunities and challenges within industries and markets.

ENES663 Strategies for Managing Innovation (3 Credits)
Emphasizes how innovative leaders can use strategic management of innovation and technology to enhance firm performance. It helps students to understand the process of technological change; the ways that firms come up with innovations; the strategies that firms use to benefit from innovation; and the process of formulating technology strategy. It provides frameworks for analyzing key aspects of these industries and teaches students how to apply these frameworks.

ENES664 Business Modeling and Customer Validation (3 Credits)
Focuses on how to create and deliver value for customers and extract value for the new venture. Develop business models that encompass the product or service, customers, and the economic engine to meet the venture's financial and growth objectives. Introduces a structured way to think about, analyze, and develop a sound business model that is customer validated.
Prerequisite: ENES662 and ENES663.

ENES665 Innovative Thinking (3 Credits)
Introduces students to new and powerful tools to boost their creative problem solving skills. Participants re-discover their communication and teaming skills. Students unlock their creativity potential, and explore win-win approaches to define and solve problems of different kinds. Students are also introduced to topics related to intellectual property.
Prerequisite: ENES662 and ENES663.

ENES666 Creative Design, Prototyping, and Testing (3 Credits)
Transition from creative, innovative, design thinking methods to prototyping and concept testing of products and services. Learn how to translate ideas into marketable offerings to create real value for customers and the new venture. Emphasis is placed on an integrated and interdisciplinary approach to engineering design, concurrent engineering, design for manufacturing, industrial design, and the business of new product development. Topics include design methods, modeling and simulation, material and manufacturing process selection, platform and modular design, mass customization, planning and scheduling, and business issues, teamwork, group dynamics, creativity, and innovation.
Prerequisite: ENES664 and ENES665.

ENES667 Market Development and Commercialization (3 Credits)
Provides an orientation to key marketing concepts critical to marketing technology-based products and services. Learn to identify market opportunities, understand customer preferences, evaluate market acceptance, and devise the appropriate going to market strategies for the new venture.
Prerequisite: ENES664 and ENES665.

ENES668 Corporate Technology Entrepreneurship (3 Credits)
Focuses on the role of entrepreneurial individuals inside of existing technology organizations. Explores developing and leading innovation inside the firm. Discusses stages of innovation in the corporate entrepreneurship process and dynamics of organizational structure, politics, decisions, financing, and personal styles.
Credit Only Granted for: ENPM 808N or ENES 668.
Formerly: ENPM 808N.

ENES670 Financial Management and New Venture Financing (3 Credits)
Provides the essential tools and skills to build a strong financial foundation for a new technology venture. Examines accounting principles as well as methods for keeping firm financial control of the venture. Discusses navigating the multitude of financial barriers that may block entrepreneurial success, as well as how to raise the right amount of capital at the right time from the right source.
Prerequisite: ENES666 and ENES667.

ENES671 Legal Aspects of Entrepreneurship (3 Credits)
Explores critical legal and business issues entrepreneurs face as they build and launch a new venture. Examines real world scenarios, and addresses the legal issues at all of the important junctures along the path to success. Significant attention placed on new venture formation, intellectual property management, and financing arrangements.
Prerequisite: ENES666 and ENES667.

ENES672 Launching Technology Startup Ventures (6 Credits)
Explores the processes and skills needed to launch and manage technology startup ventures. Learn how to apply best practices for planning, launching, and leading new companies. Discusses a wide range of issues of importance and concern to entrepreneurs, to include how to navigate uncertainty.
Prerequisite: ENES670 and ENES671.
Credit Only Granted for: ENES660 or ENES672.

ENFP - Engineering, Fire Protection

ENFP405 Structural Fire Protection (3 Credits)
Effects of elevated temperature on structural materials; steel, concrete, wood, gypsum, glass and reinforced plastics. Experimental evaluation of fire resistance of building assemblies. Analytical methods to evaluate fire resistance of structural members.
Prerequisite: ENES220.
Restriction: Must be in Engineering: Fire Protection program; and permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP405 or ENFP621.

ENFP410 Special Hazard Suppression Systems (3 Credits)
Analysis of application and theory of fire suppression systems. The key elements of fire suppression systems will be discussed along with how they interact for effective fire suppression design. Physical mechanisms for a variety of fire suppression approaches will be discussed including hose streams, sprinklers, water mist, foam, clean agents, and chemical agents.
Prerequisite: ENFP310 and ENFP312.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP410 or ENFP653.

ENFP411 Risk-Informed Performance Based Design (3 Credits)
Appraisal and measurement of fire safety. Application of systems analysis, probability theory, engineering economy and risk management in the identification and synthesis of components of fire protection engineering. Methods for the development of criteria for the design, evaluation and assessment of fire safety or component hazards.
Restriction: Senior standing; or permission of ENGR-Fire Protection Engineering department.

ENFP413 Human Response to Fire (3 Credits)
Fractional effective dose (FED) methods for predicting time to incapacitation and death of fires for use in fire safety calculations. Physiology and toxicology of the fire effluent components, decomposition chemistry of common materials, standard experimental approaches. Predictive models of material production rates. People movement characteristics related to building evacuation. Formulation and application of evacuation models. Human behavior factors affecting response of people to fire situations.
Prerequisite: ENFP250.
Restriction: Permission of ENGR-Fire Protection Engineering department. Jointly offered with ENFP613. Credit only gran ted for: ENFP413 or ENFP613.

ENFP415 Fire Dynamics (3 Credits)
Designed to give students a quantitative understanding of fire behavior. The fundamentals of physics and chemistry of combustion are presented and used to derive key analytical relationships that describe fire growth. Application of these relationships to the analysis of common fire scenarios is emphasized.
Prerequisite: ENFP312.
Restriction: Permission of ENGR-Fire Protection Engineering department. Jointly offered with ENFP651. Credit only gran ted for: ENFP415 or ENFP651.

ENFP420 Fire Assessment Methods and Laboratory (4 Credits)
Experimental evaluation of ignition, flame spread, rate of heat release and smoke production of flammable gases, liquids, solids, and interior finish materials. Analytical and computer methods for the design, performance, and analysis of fire experiments. Preparation of laboratory reports.
Prerequisite: Student must have senior standing; and minimum grade of C- in ENFP312.
Restriction: Must be in Engineering: Fire Protection program.
Credit Only Granted for: ENFP320 or ENFP420.
Formerly: ENFP320.

ENFP425 Enclosure Fire Modeling (3 Credits)
An introduction to enclosure fire dynamics through the development of fire modeling algorithms and the application of computer-based fire modeling techniques. The objectives of the course are: to provide a basic understanding of enclosure fire dynamics with an emphasis on a system-level viewpoint (i.e., a global description of the coupling between combustion dynamics, smoke filling, vent flows and heat transfer); and to provide an introduction to the zone modeling approach. Topics covered include a review of the mathematical formulation of zone models, a discussion of numerical integration of the zone modeling equations (using MATLAB), and an introduction to zone modeling software used by professional engineers (e.g., CFAST).
Prerequisite: ENES232, ENFP300, and ENFP312.
Restriction: Must be in Engineering: Fire Protection program; and senior standing; and permission of ENGR-Fire Protection Engineering department.

ENFP426 Computational Methods in Fire Protection (3 Credits)
Introduction to computer-based fire modeling: zone modeling and Computational Fluid Dynamics (CFD); documentation of input data, validation and verification tests.
Prerequisite: ENFP425.
Restriction: Permission of ENGR-Fire Protection Engineering department.

ENFP429 Independent Studies (1-3 Credits)
For students who have definite plans for individual study of approved problems, or study of an advanced topic selected in conjunction with the faculty.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Restriction: Must be in Engineering: Fire Protection program.
Repeatable to: 6 credits if content differs.

ENFP440 Smoke Management and Fire Alarm Systems (3 Credits)
Analysis of hazard posed by smoke in buildings. Performance characteristics of smoke management systems. Review of analytical design aids. Functional analysis and design of fire detection and alerting systems. Examination and evaluation of code criteria, performance specifications and research.
Prerequisite: Must have completed with a C- or better or concurrently be enrolled in ENFP300.
Restriction: Permission of ENGR-Fire Protection Engineering department. Jointly offered with ENFP627. Credi t only granted for: ENFP440 or ENFP627.

ENFP464 Industrial Fire Safety (3 Credits)
Designed to introduce students to the basics of process safety with a focus on the methods and techniques that may be utilized when evaluating the existing or proposed safety protection solutions in industrial facilities. An emphasis is placed on properly identifying the hazards that are present, the risk exposure, and how best to address the risk. The foundation is laid by presenting the necessary background information on industrial processes and integrating this information with applicable fire/explosion safety science.
Prerequisite: Students must be of senior standing.
Restriction: Permission of ENGR-Fire Protection Engineering department. Also offered as: ENFP664.
Credit Only Granted for: ENFP464, ENFP489I, ENFP629I OR ENFP664..
Formerly: ENFP489I.
Additional Information: The course will be taught as a dual senior-level undergraduate course and graduate course.

ENFP465 Fire and Explosion Investigations (3 Credits)
This course covers many aspects of fire and explosion investigation and reconstruction. Information on field techniques, applicable standards, and best practices are presented with an emphasis on how fire science and fire dynamics can be applied to forensic analysis. Experiments are performed and analyzed to demonstrate the concepts.
Prerequisite: Student should have senior standing.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP489N, ENFP629N OR ENFP665.
Formerly: ENFP489N.
Additional Information: The course will be taught as a shared senior-level undergraduate course and graduate course.

ENFP467 Wildland Fires: Science and Applications (3 Credits)
Introduction to the global problem of wildland fires with an overview of the social, political and environmental issues posed as well as detailed coverage of the science, technology and applications used to predict, prevent and suppress wildland fires.
Prerequisite: ENFP312.
Restriction: Must be in Engineering: Fire Protection program; and permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP489W, ENFP629W, or ENFP667.
Formerly: ENFP489W.

ENFP489 Special Topics (3 Credits)
Selected topics of current importance to fire protection.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Repeatable to: 6 credits.

ENFP601 Introduction to Fire Protection Engineering (3 Credits)
The basic concepts of life safety, water-based fire protection systems, building construction, codes and standards along with tenability, fire behavior, and human behavior are introduced along with traditional and performance-based approaches for analyzing human response to fire. Students learn to analyze the egress systems and design basic water-based fire suppression systems.
Additional Information: Highly recommended to incoming graduate students to Fire Protection Engineering who have not earned a Bachelor's Degree in Fire Protection Engineering.

ENFP611 Fire Induced Flows (3 Credits)
Theoretical basis is presented for fire induced bouyancy driven flows. Plumes, ceiling jets, vent flows, compartment flows. Dimensional analysis for correlations and scale model applications. Smoke movement and combustion products.
Prerequisite: ENFP415.

ENFP613 Advanced Life Safety Analysis (3 Credits)
Fractional effective dose (FED) methods for predicting time to incapacitation and death of fires for use in fire safety engineering calculations. Physiology and toxicology of fire effluent components, decomposition chemistry of common materials, standard experimental approaches. Predictive models of material production rates. People movement characteristics related to building evacuation. Formulation and application of evacuation models. Human behavior factors affecting response of people to fire situations.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP413 or ENFP613.

ENFP619 Graduate Seminar (1-3 Credits)
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Restriction: Must be in ENGR: MS Only-Fire Protection Engineering (Master's) program.
Repeatable to: 3 credits.

ENFP620 Fire Dynamics Laboratory (3 Credits)
Laboratory experiments are designed to illustrate fire phenomena and test theoretical models. Diffusion flames, ignition and flame spread on solids, liquid pool fires, wood crib fires, fire plumes, compartment fires.
Recommended: ENFP415.

ENFP621 Analytical Procedures of Structural Fire Protection (3 Credits)
Analysis procedures for structural components of wood, steel, concrete, composites. Structural capabilities, modifications under fire induced exposures. Calculations, computer models for predicting fire resistance ratings of structural components.
Prerequisite: ENFP312. Cross-listed with ENFP621.
Credit Only Granted for: ENFP405 or ENFP621.

ENFP625 Advanced Fire Modeling (3 Credits)
Validity, utility, reliability of current computer models. Applications of models in risk assessment, underwriting, loss prediction, hazard analysis. Development and validation of specific application models.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.

ENFP626 Computational Fire Modeling (3 Credits)
Introduction to Computational Fluid Dynamics (CFD)-based fire modeling; governing equations of turbulent reacting flows; numerical approaches to the treatment of turbulence (DNS, LES, RANS); numerical methods for partial differential equations; physical modeling of enclosure fires (turbulence, combustion, thermal radiation, pyrolysis, suppression). Development of sample programs (Matlab) and use of current CFD-based fire models (FDS).
Prerequisite: ENFP300 and ENFP312.
Restriction: Permission of ENGR-Fire Protection Engineering department.

ENFP627 Smoke Detection and Management (3 Credits)
Analysis of hazard smoke. Response analysis of smoke detectors based on characteristics of detectors and properties of smoke. Performance characteristics and limitations of smoke management systems. Capabilities and limitations of analytical design aids.
Prerequisite: ENFP300. Jointly offered with ENFP440. Credit only grant ed for: ENFP627 or ENFP440.

ENFP629 Selected Topics (3-6 Credits)
Current research, studies in fire protection engineering. Future trends and significant changes in research, professional areas. The professional standards process.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Restriction: Must be in ENGR: MS Only-Fire Protection Engineering (Master's) program.
Repeatable to: 6 credits.

ENFP630 Diffusion Flames and Burning Rate Theory (3 Credits)
Basic principles of diffusion flames for gaseous, liquid, and solid fuels. Droplet burning, B number, jet combustion, boundary layer combustion, generalized methods.
Prerequisite: ENFP312.

ENFP649 Special Problems (1-3 Credits)
Advanced topics selected by the faculty from the current literature to suit the special needs and background of students, or for individual students who have definite plans of individual study.
Restriction: Must be in ENGR: MS Only-Fire Protection Engineering (Master's) program; and permission of instructor; and permission of ENGR-Fire Protection Engineering department.
Repeatable to: 6 credits if content differs.

ENFP651 Advanced Fire Dynamics (3 Credits)
A review of the basic chemistry and physics necessary to understanding fire dynamics; and of the physics of heat transfer and turbulent fluid flow will be given. The nature and structure of premixed and diffusion flames will be presented.
Credit Only Granted for: ENFP629A or ENFP651.
Formerly: ENFP629A.

ENFP652 Fire Assessment Methods (3 Credits)
This on-line course offers a comprehensive review of experimental techniques to assess fire performance characteristics of materials, products and assemblies.
Credit Only Granted for: ENFP629B or ENFP652.
Formerly: ENFP629B.

ENFP653 Advanced Fire Supression (3 Credits)
Issues related to the suppression of fires and the design of fire suppression systems. Theoretical aspects of fire suppression and extinction are considered to provide the foundation for the practical design of different types of fire suppression systems. Focus on water-based and "clean agent" fire suppression systems, with emphasis on high challenge and special hazard applications. Systems using other agents are introduced, but are not addressed in detail.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP410, ENFP489L, ENFP653, or ENFP629C.
Formerly: ENFP629C.

ENFP654 Fire Suppression Sprays (3 Credits)
Fire suppression mechanisms and goals are presented as a basis for fire suppression spray and nozzle designs. Basic spray formation theory is presented describing how sprays are generated by fire suppression nozzles (e.g. sprinklers). Methods and techniques are introduced for measuring and analyzing sprays based on their stochastic characteristics. Basic equations for evaluating the dispersion and coverage performance of sprays are presented.
Recommended: ENFP300 and ENFP312.

ENFP655 Smoke Control (3 Credits)
Introduces the student to smoke control needs, design approaches and analytical methods. Students should develop an understanding of the performance characteristics and limitations of smoke control systems and the capabilities and limitations of analytical design aids. This course gives students an opportunity to integrate a broad range of information from previous courses with material from this course, such as fluid mechanics, heat transfer, and fire dynamics, and fire modeling. Students will review data from past experimental programs and apply computer model(s).
Restriction: Permission of Maryland Applied Graduate Engineering.

ENFP661 Forensic Fire Analysis (3 Credits)
This on-line course addresses the forensic analysis of structural fire incidents in terms of enclosure fire dynamics and the impact of fire safety subsystems used to prevent or mitigate the consequences of fire. These subsystems include: ignition prevention, material flammability and flame spread, fire detection and alarm, fire suppression, smoke movement and management, structural fire protection and egress systems. Failures in these subsystems are addressed in terms of differences between expected and observed performance.
Credit Only Granted for: ENFP629D or ENFP661.
Formerly: ENFP629D.

ENFP662 Performance Based Design (3 Credits)
This on-line course demonstrates how fire science can be used to solve fire protection problems in the built environment and will provide an understanding of their performance-based design process, deterministic and risk-based analysis techniques, development of design fire scenarios, trial design development and analysis, and building lifecycle management.
Credit Only Granted for: ENFP629E or ENFP662.
Formerly: ENFP629E.

ENFP663 Advanced Fire Risk Modeling (3 Credits)
This on-line course addresses the fundamentals of fire risk modeling from both theoretical and applied perspectives.
Credit Only Granted for: ENFP629R or ENFP663.
Formerly: ENFP629R.

ENFP664 Advanced Industrial Fire Safety (3 Credits)
This class is designed to introduce students to the basics of process safety with a focus on the methods and techniques that may be utilized when evaluating the existing or proposed safety protection solutions in industrial facilities. An emphasis is placed on properly identifying the hazards that are present, the risk exposure, and how best to address the risk. The foundation is laid by presenting the necessary background information on industrial processes and integrating this information with applicable fire/explosion safety science.Jointly offered with ENFP464.
Credit Only Granted for: ENFP489I, ENFP62 9I, ENFP464, or ENFP664.
Formerly: ENFP489I and ENFP629I.

ENFP665 Advanced Fire and Explosion Investigations (3 Credits)
This course covers many advanced aspects of fire and explosion investigation and reconstruction. Information on field techniques, applicable standards, and best practices are presented with an emphasis on how advanced fire science and fire dynamics can be applied to forensic analysis. Experiments are performed and analyzed to demonstrate the concepts.
Restriction: Permission of the Fire Protection Engineering department. Jointly offered with: ENFP465.
Credit Only Granted for: ENFP629N, ENFP489N OR ENFP465.
Formerly: ENFP629N.
Additional Information: The course will be taught as a shared senior-level undergraduate course and graduate course.

ENFP667 Advanced Wildland Fires: Science and Applications (3 Credits)
Introduction to the global problem of wildland fires with an overview of the social, political and environmental issues posed as well as detailed coverage of the science, technology and applications used to predict, prevent and suppress wildland fires.
Prerequisite: ENFP312.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP489W, ENFP629W, or ENFP467.
Formerly: ENFP629W.

ENFP671 Material Flammability (3 Credits)
Introduction to the science and technology of polymeric materials. Standard methods for assessment of fire hazards associated with these materials are reviewed. Fundamental mechanisms defining polymer combustion in various scenarios are elucidated.
Recommended: Completion of ENFP415 or ENFP651 and ENFP320 or ENFP420 recommended.
Restriction: Permission of ENGR-Fire Protection Engineering department.
Credit Only Granted for: ENFP629M or ENFP671.
Formerly: ENFP629M.

ENFP799 Master's Thesis Research (1-6 Credits)
Development and completion of Master's Thesis.
Prerequisite: Permission of ENGR-Fire Protection Engineering department.
Recommended: Completion of ENFP graduate requirements.
Repeatable to: 6 credits.

ENGL - English

ENGL402 Chaucer (3 Credits)
Works read in Middle English. Readings may include Canterbury Tales, Troilus and Criseyde, dream visions, lyrics.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL403 Shakespeare: The Early Works (3 Credits)
Close study of selected works from the first half of Shakespeare's career. Generic issues of early histories, comedies, tragedies. Language, theme, dramatic technique, sources, and early modern English social-historical context.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL404 Shakespeare: The Later Works (3 Credits)
Close study of selected plays from the second half of Shakespeare's career. Generic issues of later tragedies, later comedies, romances. Language, theme, dramatic technique, sources, and early modern English social-historical context.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL407 Non-dramatic Literature of the Sixteenth Century (3 Credits)
Poetic and prose genres--utopia, epic, narrative, lyric, sonnet, oration, epistle, sermon, apologia--in context of the literary and intellectual life of the sixteenth century. Writers such as More, Wyatt, Surrey, Sidney, and Spenser.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL408 Literature by Women Before 1800 (3 Credits)
Selected writings by women in the medieval and early modern era.
Prerequisite: Must have completed two English courses in literature; or permission of the Harriet Tubman Department of Women, Gender, and Sexuality Studies.
Repeatable to: 9 credits if content differs. Cross-listed with: WGSS408.
Formerly: WMST408.

ENGL409 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

ENGL410 Edmund Spenser (3 Credits)
Selected works of Edmund Spenser in their literary, social, and historical contexts. Special attention to The Faerie Queene; also sonnets and lyric poetry.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL412 Literature of the Seventeenth Century, 1600-1660 (3 Credits)
Works from early Stuart through Interregnum period. Major literary genres in historical contexts. Writers such as Donne, Jonson, Mary Wroth, Bacon, Browne, and Marvell.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL414 Milton (3 Credits)
Poetry and major prose in their social, political, and literary-historical contexts. Special attention to Paradise Lost. Other works may include Samson Agonistes and shorter poems.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL415 Literature of the Seventeenth Century, 1660-1700 (3 Credits)
English poetry, drama, fiction, and non-fiction written from the Restoration of Charles II to 1700. Attention to increasing literacy and publication and greater involvement by women in literary production. Authors include Milton, Dryden, Congreve, and Behn.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL416 Literature of the Eighteenth Century, 1700-1750 (3 Credits)
British literary traditions, including the poetry of Pope, the prose of Swift, the correspondence of Montagu, the drama of Gay, and early novels by Defoe, Richardson, and Fielding.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL417 Literature of the Eighteenth Century, 1750-1800 (3 Credits)
British poetry, drama, fiction, and nonfiction, emphasizing innovative forms and attitudes in genres such as the gothic novel and political writings, as well as more traditional works. Authors include Johnson, Burney, Sterne, Burke, and Wollstonecraft.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL420 English Romantic Literature (3 Credits)
British poetry, drama, fiction, and criticism c.1790 to c.1830, a period of dramatic social change and revolution in literature, philosophy, the arts, industry, and politics. Authors include Austen, Wordsworth, Coleridge, Keats, Byron, Percy, and Mary Shelley.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL422 English Victorian Literature (3 Credits)
A survey of English literature of the Victorian period. Writers may include Arnold, Browning, Tennyson, Dickens, George Eliot, Carlyle, Ruskin, Newman, and Wilde.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL425 Modern British Literature (3 Credits)
Major Modernist writers in English prose and poetry since 1900. Such writers as Eliot, Larkin, Forster, Burgess, Durrell, Henry Green, Golding, Auden, Malcolm Lowry, Joyce, and Yeats.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL428 Seminar in Language and Literature (3 Credits)
Topics will vary each semester. The course will provide a seminar experience in material or methodologies not otherwise available to the major.
Restriction: Junior standing or higher; and must be in the English Honors program or gain permission from the department.
Repeatable to: 12 credits if content differs.

ENGL429 Independent Research in English (1-6 Credits)
An advanced independent research project for qualified students, supervised by an English faculty member, on a topic not ordinarily covered in available courses.
Prerequisite: ENGL301; and two English courses (excluding fundamental studies requirement); and permission of ARHU-English department.
Restriction: Sophomore standing or higher.
Repeatable to: 9 credits if content differs.

ENGL430 Literature of the Americas from First Contact to Revolution (3 Credits)
Examines the literature of the cultural encounters, colonialisms, empires, and independence movements in the early Americas from 1492 through the eighteenth century. Writers typically include Christopher Columbus, John Smith, Anne Bradstreet, Jonathan Edwards, William Byrd, Olaudah Equiano, Phillis Wheatley, and Benjamin Franklin.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL431 American Literature: Revolution to Civil War (3 Credits)
An examination of nationalism, sentimentalism, and romanticism, with writings focusing on such topics as slavery and democracy during the 1770s to 1860s. Authors typically include Ralph Waldo Emerson, Margaret Fuller, Emily Dickinson, Walt Whitman, Frederick Douglass, Harriet Beecher Stowe, Edgar Allan Poe, Nathaniel Hawthorne, and Herman Melville.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL432 American Literature: 1865 to 1914, Realism and Naturalism (3 Credits)
Reconstruction, Realism, Naturalism. Representative writers such as Dickinson, James, Dreiser.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL433 American Literature: 1914 to the Present, the Modern Period (3 Credits)
Modernism, Postmodernism. Writers such as Stevens, Stein, Ellison.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL435 American Poetry: Beginning to the Present (3 Credits)
Selections of American poetry, from Bradstreet to contemporary free verse. Authors such as Whitman, Dickinson, Bishop, Hughes, Rich, and Frost.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL437 Contemporary American Literature (3 Credits)
Prose, poetry, drama of living American writers. Current cultural and social issues.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL438 Selected Topics in Media Studies (3 Credits)
Advanced study of a topic pertinent to how the material production, technologies, and cultural practices of diverse types of media shape meaning.
Prerequisite: Two English courses beyond Fundamental Studies; or permission of ARHU-English department.
Recommended: At least one prior course in Media Studies.
Repeatable to: 9 credits if content differs.

ENGL439 Spotlight on Major Writers (3 Credits)
An intensive study of a single writer, or a handful of writers, to understand the shifts in the writer's craft and cultural influence, both past and present.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL440 The Novel in America to 1914 (3 Credits)
Survey of the American novel to World War I. Cultural and philosophical contexts; technical developments in the genre. Authors such as Melville, Wells Brown, James, Sedgwick, Chopin.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL441 The Novel in America Since 1914 (3 Credits)
Survey of the American novel since World War I. Cultural and philosophical contexts, technical developments in the genre. Authors such as Hemingway, Cather, Faulkner, Anne Tyler, Morrison.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL444 Feminist Critical Theory (3 Credits)
Issues in contemporary feminist thought that have particular relevance to textual studies, such as theories of language, literature, culture, interpretation, and identity.
Prerequisite: WMST200, WGSS200, WMST250, WGSS250, or ENGL250. Cross-listed with: WGSS444.
Credit Only Granted for: ENGL444, WMST444 or WGSS444.
Formerly: WMST444.

ENGL445 Modern British and American Poetry (3 Credits)
The formation of Modernism in British and American poetry before 1930. Such poets as Yeats, Pound, H.D., Eliot, Langston Hughes, Moore, Stevens, and Williams.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL446 Post-Modern British and American Poetry (3 Credits)
British and American poets from the 1930s to the present. Such poets as Auden, Williams, Plath, Brooks, Lowell, Wolcott, Ted Hughes, Bishop, Larkin, Jarrell, and Berryman.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL448 Literature by Women of Color (3 Credits)
Literature by women of color in the United States, Britain, and in colonial and post-colonial countries.
Prerequisite: Must complete two English courses in literature; or permission of the Harriet Tubman Department of Women, Gender, and Sexuality Studies.
Repeatable to: 9 credits if content differs. Cross-listed with: WGSS448.
Formerly: WMST448.

ENGL449 Selected Topics in U.S. Latinx Literature (3 Credits)
Advanced study of selected works by U.S. Latinx writers.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL450 Renaissance Drama I (3 Credits)
Drama of the sixteenth century, from Sir Thomas More's circle through Lyly, Greene, Marlowe, and their successors. Interludes, school drama, comedy and tragedy, professional theater. Influences of humanism, Protestantism, politics, and cultural change.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL451 Renaissance Drama II (3 Credits)
Drama in early decades of the seventeenth century. Playwrights include Jonson, Middleton, Marston, Webster, Beaumont and Fletcher. Tragedy, city comedy, tragicomedy, satire, masque. Pre-Civil War theatrical, political, and religious contexts.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL452 English Drama From 1660 to 1800 (3 Credits)
Restoration and eighteenth-century drama, with special attention to theater history, cultural influences, concepts of tragedy, comedy, farce, parody, and burlesque, as well as dramatic and verbal wit.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL453 Literary Theory (3 Credits)
An in-depth study of literary and critical theory.
Prerequisite: Two courses in literature; or permission of ARHU-English department.

ENGL454 Modern Drama (3 Credits)
The history of modern British drama, from its roots in Chekhov and Ibsen, through the modernisms of Samuel Beckett and Bertolt Brecht, through the Angry Young Men of the 1950s, and right up to the present. Most plays will be from the last 40 years, by writers such as David Hare, Tom Stoppard, Lucy Kirkwood, Caryl Churchill, Roy Williams, Lucy Prebble, Alan Bennett, Brian Friel, Terrence Rattigan, Kwame Kwei-Armah, Sarah Kane, and Alice Birch. We will also look at how class, money, immigration, and the end of the Empire changed British plays over time. And we will consider modern theater architecture and production design as well as the directing instincts of, for instance, Peter Brook, Katie Mitchell, Marianne Elliott, and Nicholas Hytner.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL455 The Eighteenth-Century English Novel (3 Credits)
The origins and development of the British novel, from the late seventeenth century until the beginning of the nineteenth. Questions about what novels were, who wrote them, and who read them. Authors such as Behn, Defoe, Richardson, Fielding, Sterne, Smollett, Burney, Radcliffe, and Austen.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL456 The Nineteenth-Century English Novel (3 Credits)
Surveys major novels of the period. Attention to narrative form and realism; representations of gender and class; social contexts for reading, writing and publishing. Authors such as Austen, Bronte, Dickens, George Eliot, Trollope.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL457 The Modern Novel (3 Credits)
Modernism in the novel of the twentieth century. Such writers as Joyce, Lawrence, Murdoch, James, Forster, Faulkner, Hemingway, Fitzgerald, Ellison, Welty, Nabokov and Malamud.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL458 Literature by Women After 1800 (3 Credits)
Selected writings by women after 1800.
Prerequisite: Must have completed two English courses in literature; or permission of Harriet Tubman Department of Women, Gender, and Sexuality Studies.
Repeatable to: 9 credits if content differs. Cross-listed with: WGSS458.
Formerly: WMST458.

ENGL459 Selected Topics in LGBTQ+ Literatures and Media (3 Credits)
Advanced study of a topic pertinent to literary and cultural expressions of LGBTQ+ identities, positionalities, and analytics through an exploration of literature, art, and/or media.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL460 Archival Research Methods in English Studies (3 Credits)
Introduces approaches for doing archival research in English studies, exploring how researchers develop their scope and practices of study and how they access and use archival materials electronically and on site to further their research questions. Investigates a historical period, genre, or theme through the lens of manuscripts, ephemera, and other artifacts. Case studies vary by semester.
Prerequisite: Two English courses beyond the Fundamental Studies courses; or permission of ARHU-English Department.

ENGL461 Qualitative Research Methods in English Studies (3 Credits)
Introduces approaches to qualitative research in English studies, exploring how researchers build knowledge about writing and literacy. Explores qualitative methodologies such as ethnography, case study, and grounded theory. Introduces principles of ethical and responsible research practices. Engages students in practices of data collection (such as interview, observation, and survey), as well as practices of data analysis and reporting.
Prerequisite: Two English courses beyond the Fundamental Studies courses; or permission of ARHU-English Department.
Credit Only Granted for: ENGL488R or ENGL461.
Formerly: ENGL488R.

ENGL462 Folksong and Ballad (3 Credits)
A cross-section of American folk and popular songs in their cultural contexts; artists from Bill Monroe to Robert Johnson.

ENGL463 Narrative Analysis Methods in English Studies (3 Credits)
Approaches to literary narrative analysis. Explores narrative theory as a research method for studying the fundamental categories of literary narrative--such as the narrator, character, plot, closure, and frames, as well as the nature of fictionality and the role of the reader--and for interpreting their deployment in individual literary works. We will use this method to examine particularly unusual and even radical fiction, so we can understand the meaning-making work accomplished by narrative form.
Prerequisite: Two English courses beyond Fundamental Studies; or permission of ARHU-English department.

ENGL466 Arthurian Legend (3 Credits)
Development of Arthurian legend in English and continental literature from Middle Ages to twentieth century. All readings in modern English.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL467 Critical and Creative Approaches to Digital Textuality (3 Credits)
Examines electronic literature and other aspects of the literary world online with a focus on experimental writing with computers. Topics may include digital fiction and storytelling, analysis of literary texts using digital tools, bots, book hacking, flash fiction, narrative in games, and the history of computer-generated writing. No programming experience required.
Prerequisite: One English course in literature; or permission of ARHU-English department.

ENGL468 Selected Topics in Film Studies (3-9 Credits)
Advanced studies in various periods and genres of film.
Prerequisite: ENGL245, FILM245, FILM283, or SLLC283; or permission of ARHU-English department.
Recommended: ENGL329, CMLT280, and ENGL245.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: ENGL468, ENGL479E-Spr 2008, ENGL479F-Spr 2009, ENGL479G-Fall 2008, or ENGL479M-Fall 2009/Fall 2010.

ENGL469 The Craft of Literature: Creative Form and Theory (3 Credits)
Examines various forms of poetry and/or fiction, emphasizing the practice of making literary art and the aesthetic and theoretical approaches that define it. Students will practice the elements of literary craft, producing and experimenting with a wide range of forms and conventions in poetry and/or fiction. They will also produce critical work that articulates and contextualizes theoretical approaches to the making of literary art.
Prerequisite: 2 ENGL courses in literature or creative writing; and have completed a 200-level creative writing workshop in ENGL. Or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL470 African-American Literature: From Slavery to Freedom (3 Credits)
Examines African-American literature from its beginnings to the early twentieth century, including genres ranging from slave narratives, pamphlets, essays, and oratory, to poetry and fiction. Our emphasis is on the interaction between literature and literary forms, on the one hand, and historical and political developments in the push toward emancipation, on the other.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL471 African-American Literature: 1910-1945 (3 Credits)
Emergence of modernism in African-American writing including debates over the definition of unique African-American aesthetics, with emphasis on conditions surrounding the production of African-American literatures.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL472 African-American Literature: 1945 to Present (3 Credits)
Transformation of African-American literatures into modern and postmodern forms. Influenced by World War II and the Civil Rights and Black Power movements, this literature is characterized by conscious attempts to reconnect literary and folk forms, the emergence of women writers, and highly experimental fiction.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL475 Postmodern Literature (3 Credits)
The origins and ongoing development of postmodern literature. Aspects of the "postmodern condition," such as the collapse of identity, the erasure of cultural and aesthetic boundaries, and the dissolution of life into textuality. The novel and other genres and media.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.

ENGL478 Selected Topics in Literature before 1800 (3 Credits)
Advanced study of key topics in literary works from earlier historical periods.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL479 Selected Topics in Literature after 1800 (3 Credits)
Advanced study of key topics in literary works from later historical periods.
Prerequisite: Two English courses in literature; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL482 History of the English Language (3 Credits)
Examines the origins and development of the English language.
Prerequisite: ENGL280, LING200, or HESP120; or permission of ARHU-English department.

ENGL483 American English(es) (3 Credits)
Examines the diversity of dialects, registers, and jargons of English found in the United States, as well as their origins, structures, and functions in society.
Prerequisite: LING200, ENGL280, or HESP120; or permission of ARHU-English department.

ENGL484 Style and Grammar in Written English (3 Credits)
The linguistic analysis of written texts. Examines grammatical and discursive constructions above the level of the sentence and their functions in literary and non-literary texts. We will study narrative structure, authorial voice, genre, register, stance, viewpoint, empathy, surprise, and humor in language.
Credit Only Granted for: ENGL484 or LING402.

ENGL487 Principles and Practices of Rhetoric (3 Credits)
A seminar examining foundational concepts and approaches in the theory and practice of rhetoric in civic, professional, academic, and interpersonal settings; focusing on key issues in persuasion, argumentation, and eloquence in historical and contemporary contexts.

ENGL488 Topics in Advanced Writing (3 Credits)
Different genres of technical and professional writing including proposal writing, computer documentation, technical report writing, instruction manuals, etc. Students will analyze models of a genre, produce their own versions, test, edit and revise them.
Repeatable to: 9 credits if content differs.

ENGL489 Special Topics in Language and Rhetoric (3 Credits)
Special topics in language and rhetoric, such as discourse analysis, semantics, or cognitive linguistics; comparative rhetoric and rhetorical theory, digital rhetorics, women's and minority rhetorics, or the history of rhetoric.
Repeatable to: 9 credits if content differs.

ENGL491 Digital Rhetoric (3 Credits)
Examines the social significance of the ways digital texts are composed and circulated. Explores why it matters how the web is written and who does the writing, understanding the Internet as rhetorical from its content and communities to the code, protocols, and policies that control digital distribution. Includes active experimentation with digital tools so students can expand their theoretical understanding through critical making.
Prerequisite: Students must have satisfied the Fundamental Studies Academic Writing requirement.
Credit Only Granted for: ENGL489J, or ENGL491.
Formerly: ENGL489J.

ENGL492 Graphic Design and Rhetoric (3 Credits)
An exploration of the visual dimensions of texts and the skills involved in designing them well. Considers graphic design theory and history from a rhetorical perspective, working to understand and practice the use of symbol systems to express, inform, and advocate. Includes direct experimentation with the principles and techniques of graphic design.
Prerequisite: Students must have satisfied Fundamental Studies Academic Writing requirement.

ENGL493 Writing Genres as Social Action (3 Credits)
A rhetorical genre studies approach to understanding the work that texts do in the world. Examines issues of identity, power, and medium as they relate to writing in various contexts. Students analyze the texts, context(s), and social significance of a public, professional, digital, and/or advanced academic genre and produce writing that meets, modifies, and subverts expectations.
Recommended: Satisfactory completion of the professional writing requirement (FSPW).
Restriction: Must have earned a minimum of 60 credits.

ENGL494 Editing and Document Design (3 Credits)
Principles of general editing for clarity, precision and correctness. Applications of the conventions of grammar, spelling, punctuation and usage, and organization for logic and accuracy. Working knowledge of the professional vocabulary of editing applied throughout the course.
Prerequisite: ENGL393 or ENGL391; or students who have taken courses with comparable content may contact the department.

ENGL495 Independent Study in Honors (1-3 Credits)
Completion and presentation of the senior honors project.
Prerequisite: ENGL373 and ENGL370.
Restriction: Must be in English Language and Literature program; and candidacy for honors in English.

ENGL497 English at Work (3 Credits)
Examines how English majors put their academic knowledge and skills to work in professional workplaces after graduation. Students learn strategies to research careers, and they shadow a person in a career of interest for a day. Students learn to compose different professional genres to write and speak about and for professional development and advancement, including inquiry letters, technical descriptions, professional portfolios, and elevator pitches. Students will critically examine the learning they have done in their undergraduate coursework and compose a vision for bringing that learning to life in their future work.
Prerequisite: ENGL301; and an ENGL course at the 300-level or higher.
Restriction: Must have earned a minimum of 60 credits.

ENGL498 Advanced Fiction Workshop (3 Credits)
An advanced class in the making of fiction. Intensive discussion of students' own fiction. Readings include both fiction and essays about fiction by practicing writers. Writing short critical papers, responding to works of fiction, and to colleagues' fiction, in-class writing exercises, intensive reading, and thinking about literature, in equal parts, and attendance at readings.
Prerequisite: ENGL352; or permission of ARHU-English department.
Repeatable to: 9 credits if content differs.
Formerly: ENGL496.

ENGL499 Advanced Poetry Workshop (3 Credits)
An advanced class in the making of poetry. Intensive discussion of students' own poems. Readings include both poetry and essays about poetry by practicing poets. Writing short critical prose pieces, responding critically to colleagues' poems, in-class and outside writing exercises, and attendance at poetry readings.
Prerequisite: ENGL353; or permission of ARHU-English department.
Repeatable to: 9 credits.
Formerly: ENGL497.

ENGL601 Literary Research and Critical Contexts (3 Credits)

ENGL602 Critical Theory and Literary Criticism (3 Credits)
An introduction to critical theory and literary criticism, with an overview of major movements (including formalism, structuralism and poststructuralism, Marxism, psychoanalysis, and feminism). Designed to help graduate students assess the various ways of approaching and writing about literature.

ENGL607 Readings in the History of Rhetorical Theory to 1900 (3 Credits)
Earlier theories of effective written discourse surveyed historically and as influenced by ethical, technical, and social change.

ENGL609 Technologies of Writing (3 Credits)
ENGL 609 - Technologies of Writing: Readings in the technologies of writing systems, print, and new media.
Restriction: Permission of ARHU-English department.
Repeatable to: 9 credits if content differs.
Additional Information: May fulfill a requirement for the MA in English with a Concentration in Rhetoric and Composition.

ENGL611 Approaches to College Composition (3 Credits)
A seminar emphasizing rhetorical and linguistic foundations for the handling of a course in freshman composition.
Prerequisite: Permission of ARHU-English department.
Additional Information: Required for graduate assistants (optional to other graduate students).

ENGL612 Approaches to Professional and Technical Writing (3 Credits)
A pedagogical approach to professional and technical writing, its history and methodolgy.

ENGL618 Writing for Professionals (3 Credits)
Writing proposals, reports, manuals, policy statements, correspondence, etc. for typical government and business settings. Principles of rhetorical and linguistic analysis and techniques for managing the review process in large organizations.
Repeatable to: 9 credits if content differs.

ENGL619 Readings in Linguistics (3 Credits)
A survey of theoretical and applied linguistics.
Restriction: Permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL620 Readings in Medieval English Literature (3 Credits)

ENGL621 Readings in Renaissance English Literature (3 Credits)

ENGL622 Readings in Seventeenth-Century English Literature (3 Credits)

ENGL623 Readings in Eighteenth-Century English Literature (3 Credits)

ENGL624 Readings in English Romantic Literature (3 Credits)

ENGL625 Readings in English Victorian Literature (3 Credits)

ENGL626 Readings in American Literature before 1865 (3 Credits)

ENGL628 Readings in African American Literature (3 Credits)

ENGL629 Readings in Folklore, Folklife, and Myth (3 Credits)
Readings pertaining to various genres of folklore and myth such as oral narrative, epic poetry, ballad, folksong, belief, custom and material culture, with special attention given to the history of the study of folklore including fieldwork, interpretation and the political application of these materials. Explores issues of ethnicity, geography, religion, race, gender, and class, as well as the ongoing relations between orality, literacy, print, and other media.
Restriction: Permission of ARHU-English department.
Repeatable to: 6.0 credits if content differs.

ENGL630 Readings in 20th Century English Literature (3 Credits)

ENGL631 Readings in 20th Century American Literature (3 Credits)

ENGL638 Readings in Film as Text and Cultural Form (3 Credits)
An inquiry into theoretical approaches to the cinematic text that include studies of form, culture, reception, ideological formations, historical contextualizations, and the problematics of representation.
Repeatable to: 6 credits if content differs.

ENGL648 Contemporary American Literature (3 Credits)
A survey of American literature in the 21st Century.
Restriction: Permission of ARHU-English department.
Repeatable to: 9 credits.

ENGL649 Readings in Rhetoric, Composition, and Literacy (3 Credits)
Readings in Rhetoric, Composition, and Literacy. Special Topics in the theory and research of rhetoric, composition, and literacy
Restriction: Permission of ARHU-English department.
Repeatable to: 9 credits if content differs.
Additional Information: May fulfill requirement for MA in English with a Concentration in Rhetoric and Composition.

ENGL658 Readings in Multi-Ethnic Literatures of the Americas (3 Credits)
Highlights the cultural diversity of American literatures from various periods, including Latino/a, Native American, Asian American, and African American literatures within and beyond the United States.
Restriction: Permission of English Department.
Repeatable to: 9 credits if content differs.

ENGL659 Readings in Postcolonial Literatures and Theory (3 Credits)
Readings in post-colonial, diasporic, and trans-national theory and literature.
Restriction: Permission of ARHU-English department.
Repeatable to: 6 credits if content differs.

ENGL668 Readings in Modern Literary Theory (3-6 Credits)
Formerly: ENGL666.

ENGL679 Professional and Career Mentoring for Master's Students (1-3 Credits)
Augments advising currently provided by the English Department Graduate Studies Office. Individual professional and career mentoring for MA and MFA students from a faculty member.
Repeatable to: 6 credits if content differs.

ENGL688 Poetry Workshop (3 Credits)
Poetry workshop.
Prerequisite: Permission of ARHU-English department.

ENGL689 Fiction Workshop (3 Credits)
Fiction workshop.
Prerequisite: Permission of ARHU-English department.

ENGL699 Independent Study (1-3 Credits)
Restriction: Permission of instructor; and departmental approval of research project.

ENGL701 Paradigms of Theory (3 Credits)
Exploration of the works of four or five major critical thinkers who underwrite the study of theory in the academy today, with special attention to the diversity within critical theory.

ENGL702 Cultures of Theory (3 Credits)
An exploration of the socio-historic, material, and cultural contexts of various theoretical practices and traditions.
Prerequisite: Must have completed an introductory course in critical theory. Cross-listed with CMLT702.
Credit Only Granted for: CMLT702 or ENGL702.

ENGL708 Seminar in Rhetoric (3 Credits)
Topics in rhetoric: history of rhetorical theory, modern rhetorical theory, rhetorical interpretation, composition theory, rhetoric of social groups.
Repeatable to: 9 credits if content differs.

ENGL718 Seminar in Medieval Literature (3 Credits)

ENGL719 Seminar in Renaissance Literature (3 Credits)

ENGL728 Seminar in Seventeenth-Century Literature (3 Credits)

ENGL729 Seminar in Eighteenth-Century Literature (3 Credits)

ENGL738 Seminar in Nineteenth-Century Literature (3 Credits)

ENGL739 Seminar in Nineteenth-Century Literature (3 Credits)

ENGL748 Seminar in American Literature (3 Credits)

ENGL749 Studies in Twentieth-Century Literature (3 Credits)

ENGL758 Literary Criticism and Theory (3 Credits)

ENGL759 Seminar in Literature and the Other Arts (3 Credits)

ENGL768 Studies in Genre (3 Credits)
Restriction: Permission of ARHU-English department.
Repeatable to: 9 credits if content differs.

ENGL775 Seminar in Composition Theory (3 Credits)
Readings and research in recent theories of effective writing.

ENGL776 Seminar in Modern Rhetorical Theory (3 Credits)
Seminar in Modern Rhetorical Theory. Theories and trends in twentieth and twenty-first century rhetorical theory
Restriction: Permission of ARHU-English department.
Additional Information: May fulfill seminar requirements for MA in English with Concentration in Rhetoric and Composition.

ENGL778 Seminar in Folklore and Myth (3 Credits)
Restriction: Permission of ARHU-English department.
Repeatable to: 6.0 credits if content differs.

ENGL779 Seminar in Language Study (3 Credits)
Seminar in linguistic aspects of literature and composition.

ENGL788 Studies in Poetic Form (3 Credits)
Repeatable to: 9 credits.

ENGL789 Form and Theory in Fiction (3 Credits)
A variety of prose modes (mediations, psychological studies, reportage myths, collage, magic realism, satire, etc.). Some of the writers to be read include Kafka, Cather, Barth, Kundera, and Barthelme.
Prerequisite: Permission of ARHU-English department.

ENGL798 Critical Theory Colloquium (1 Credit)
An intensive advanced exploration of current problems and issues in critical theory.
Prerequisite: A course in critical theory.
Repeatable to: 10 credits if content differs.

ENGL799 Master's Thesis Research (1-6 Credits)

ENGL809 Academic Publishing Worksop (1-2 Credits)
A workshop for the preparation of articles of other critical writing for publication in academic journals or other professional venues.
Restriction: Must be in a major within ARHU-English department; and permission of instructor.
Repeatable to: 8 credits if content differs.
Additional Information: Preference will be given to doctoral students beyond coursework.

ENGL819 Seminar in Themes and Types in English Literature (3 Credits)

ENGL828 Seminar in Themes and Types in American Literature (3 Credits)

ENGL829 Seminar in Postcolonial Literatures (3 Credits)
Postcolonial, transnational, and diasporic literatures in the Anglophone world.
Restriction: Permission of ARHU-English department.
Repeatable to: 6 credits if content differs.

ENGL878 Pedagogical Mentoring for Doctoral Students (1-3 Credits)
Pedagogical mentoring by roster faculty members for graduate students teaching 200-level literature courses.
Repeatable to: 12 credits if content differs.

ENGL879 Professional Mentoring for Doctoral Students (1-3 Credits)
Augments advising currently provided by the English Department Graduate Studies Office. Individual professional and career mentoring for PhD students from a faculty member.
Repeatable to: 12 credits if content differs.

ENGL888 Practicum in English Studies (1 Credit)

ENGL898 Pre-Candidacy Research (1-8 Credits)
Pedagogical mentoring by roster faculty members for graduate students teaching 200-level literature courses.
Repeatable to: 12 credits if content differs.

ENGL899 Doctoral Dissertation Research (1-8 Credits)

ENMA - Engineering, Materials

ENMA400 Introduction to Atomistic Modeling in Materials (3 Credits)
This is an introductory course designed to study atomistic modeling and simulation techniques used in materials research. This course covers the theories, methods, and applications of atomistic-scale modeling techniques in simulating, understanding, and predicting the properties of materials. Specific topics include: molecular statics using empirical force fields; quantum mechanical methods including density functional theory; molecular dynamics simulations; and Monte Carlo and kinetic Monte Carlo modeling.
Prerequisite: ENMA300, MATH206, and ENMA460.
Recommended: Basic knowledge in quantum mechanics (preferred but not required); basic knowledge in statistical mechanics (preferred but not required). Also offered as: ENMA600.
Credit Only Granted for: ENMA489A, ENMA400, ENMA698A, or ENMA600.
Formerly: ENMA489A.

ENMA410 Materials for Energy I (3 Credits)
The goal is to demonstrate the role of materials in solving one of the most critical socio-economic issues of our time, affordable and sustainable energy. There will be a discussion of U.S. and global energy and related environmental issues. Topics covered include: fuel cells and batteries (electrochemical energy conversion and storage); catalysts and membrane separations (fossil fuel and biomass energy conversion); and nuclear fuels.
Prerequisite: Minimum grade of C- in ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA410 or ENMA489H.
Formerly: ENMA 489H.

ENMA411 Materials for Energy II (3 Credits)
Demonstrates the role of materials in solving one of the most critical socio-economic issues of our time, affordable and sustainable energy. Materials for Energy is a two-part course based on material functionality; however, they are independent and neither is a prerequisite for the other. Materials for Energy II will focus on electrical, optical, thermal, and mechanically functional materials for energy devices. Solar cells, solar fuel, solar thermal, energy efficient lighting, building energy, thermoelectric and wind energy will be covered.
Prerequisite: Minimum grade of C- in ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA411 or ENMA489I.
Formerly: ENMA489I.

ENMA412 Fundamentals of Photovoltaics (3 Credits)
Overview of the fundamentals of photovoltaic devices, including principles of operation, with emphasis on the materials science aspects of the different technologies available.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.

ENMA414 Introduction to Solid State Ionics (3 Credits)
Solid State Ionics is the study of point defects in crystalline and non-crystalline solids; defect equilibria and transport; the influence of chemical and electric potentials, interfaces, and association; and the application of ionically conducting solids in solid-state electrochemical transducer systems and devices.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA414 or ENMA489W.
Formerly: ENMA489W.

ENMA421 Design of Composites (3 Credits)
Fundamentals of design, processing and selection composite materials for structural applications will be covered. The topics include a review of all classes of materials, an in-depth analysis of micro and macro mechanical behavior including interactions at the two-phase interfaces, modeling of composite morphologies for optimal microstructures, material aspects, cost considerations, processing methods including consideration of chemical reactions and stability of the interfaces, and materials selection considerations.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA421 or ENMA489A.
Formerly: ENMA489A.

ENMA422 Radiation Effects of Materials (3 Credits)
Ionizing radiation, radiation dosimetry and sensors, radiation processing, radiation effects on: polymers, metals, semiconductors, liquids, and gases. Radiation in advanced manufacturing, radiation-physical technology.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA422 or ENMA489E.
Formerly: ENMA489E.

ENMA425 Introduction to Biomaterials (3 Credits)
Examination of materials used in humans and other biological systems in terms of the relationships between structure, fundamental properties and functional behavior. Replacement materials such as implants, assistive devices such as insulin pumps and pacemakers, drug delivery systems, biosensors, engineered materials such as artificial skin and bone growth scaffolds, and biocompatibility will be covered.
Recommended: ENMA300.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: BIOE453, CHBE457, or ENMA425.

ENMA426 Reliability of Materials (3 Credits)
Students are taught the basic degradation mechanisms of materials, through the understanding of the physics, chemistry, mechanics of such mechanisms. Mechanical failure mechanisms concentrate on fatigue, and creep. Chemical failure mechanisms emphasize corrosion and oxidation. Physical mechanisms such as diffusion, electromigration, defects and defect migration, surface trapping mechanisms, charge creation and migration are also included.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA426 or ENMA489R.
Formerly: ENMA489R.

ENMA430 Quantum Size Effects in Nanomaterials (3 Credits)
Surveys materials systems whose properties are governed by quantum mechanical phenomena. The time-independent Schrodinger equation is employed to relate materials structure and size to their electrical, thermal and optical properties. Integrated throughout the course are (1) surveys of approaches for the synthesis of the nanoscale structures (nanoparticles, nanowires, nanotubes, etc.), (2) computer-based exercises, (3) review of influential articles from the scientific literature, and (4) in-depth analysis of devices and applications that utilize the quantum materials.
Prerequisite: PHYS431 or ENMA460; and (CHEM231 or CHEM481).

ENMA431 Nanomechanics of Biomaterials (3 Credits)
Focuses on the latest scientific developments and discoveries in the nanoscale structure and properties of biological materials. The course begins with introductory lectures on the various nanostructures of biomaterials, and their physiological roles under mechanical forces. General aspects of biopolymers, protein folding, and self-assembly are also covered. Next, a series of in-depth lectures are presented on the characterization methods of nanomechanical properties using single molecule techniques. Finally, current applications of nanobiomaterials in the area of molecular machines, molecular self-assembly, and nanoscaffold are discussed.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA431 or ENMA489B.
Formerly: ENMA489B.

ENMA435 Wide Bandgap Materials and Devices (3 Credits)
Presents the materials science of wide bandgap materials and analyzes the defects present in such materials from a device performance point of view.
Prerequisite: ENMA300 and ENMA465.
Corequisite: ENMA460.
Restriction: Permission of ENGR-Materials Science & Engineering department. Jointly offered with: ENMA635.
Credit Only Granted for: ENMA435 or ENMA635.

ENMA437 Machine Learning for Materials Science (3 Credits)
Familiarizes students with basic as well as state of the art knowledge of machine learning and its applications to materials science and engineering. Covers the range of machine learning topics with applications including feature identification and extraction, determining predictive descriptors, uncertainty analysis, and identifying the most informative experiment to perform next. One focus of the class is to build the skills necessary for developing an autonomous materials research system, where machine learning controls experiment design, execution, and analysis in a closed-loop.
Prerequisite: MATH206, ENMA300, and MATH461.
Restriction: Permission of ENGR-Materials Science & Engineering department. Jointly offered with: ENMA637.
Credit Only Granted for: ENMA489L, ENMA437 or ENMA637.
Formerly: ENMA489L.

ENMA440 Nano Plasma Processing of Materials (3 Credits)
Sustaining mechanisms of plasmas are covered, especially low-pressure electrical gas discharges, fundamental plasma physics, sheath formation, electric and magnetic field effects, plasma-surface interactions in chemically reactive systems, plasma diagnostic techniques and selected industrial applications of low pressure plasmas.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA440, ENMA489P, ENMA640, or ENMA698P.
Formerly: ENMA489P.

ENMA441 Characterization of Materials (3 Credits)
Techniques to characterize the properties of materials whose characteristic dimensions range from nanometers to macroscopic. These include conventional crystalline and noncrystalline materials, with a special attention to materials of current technological interest. The course will include recent results from the scientific literature.
Prerequisite: ENMA300 and MATH206.
Restriction: Permission of ENGR-Materials Science & Engineering department; and senior standing.
Credit Only Granted for: ENMA489T or ENMA441.
Formerly: ENMA489T.

ENMA442 Nanomaterials (3 Credits)
An exploration of materials whose structure places them at the boundary between small objects and large molecules. Having characteristic dimensions in the range of 1-100 nanometers, these materials are difficult to synthesize and characterize but are nevertheless at the forefront of science and technology in many fields. Also, the methods for creating, manipulating and measuring these materials with an emphasis on the current scientific literature will be covered. The novel properties and potential applications will also be addressed.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA442 or ENMA489N.
Formerly: ENMA489N.

ENMA443 Phontonic Materials, Devices and Reliability (3 Credits)
The course focuses on the understanding of the basic optical processes in semiconductors, dielectrics and organic materials. The application of such materials in systems composed of waveguides, light emitting diodes and lasers, as well as modulators is developed.
Restriction: Permission of ENGR-Materials Science & Engineering department; and junior standing or higher.
Credit Only Granted for: ENMA443 or ENMA489Z.
Formerly: ENMA489Z.

ENMA445 Liquid Crystals and Structured Soft Materials (3 Credits)
Elective course on the properties and behavior of liquid crystals and related soft materials, and their relationship to biomaterials and to applications.
Prerequisite: MATH246, PHYS270, and PHYS271.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA445 or ENMA489L.
Formerly: ENMA489L.

ENMA460 Introduction to Solid State Physics (3 Credits)
Classes of materials; introduction to basic ideal and real materials' behavior including mechanical, electrical, thermal, magnetic and optical responses of materials; importance of microstructure in behavior. One application of each property will be discussed in detail.
Prerequisite: PHYS271, PHYS270, and MATH241.
Restriction: Junior standing or higher; and must be in the Engineering: Materials Science program or Physics program. Cross-listed with: PHYS431.
Credit Only Granted for: ENMA460 or PHYS431.
Additional Information: Materials Engineering students take ENMA460 and Physics students take PHYS431.

ENMA461 Thermodynamics of Materials (3 Credits)
Thermodynamic aspects of materials; basic concepts and their application in design and processing of materials and systems. Topics include: energy, entropy, adiabatic and isothermal processes, internal and free energy, heat capacity, phase equilibria and surfaces and interfaces.
Prerequisite: ENMA300.
Restriction: Junior standing or higher.

ENMA462 Smart Materials (3 Credits)
A fundamental understanding will be provided as it relates to the following topics: ferroic materials, ferromagnets, ferroelectric materials, shape memory alloys and multiferroic materials that are simultaneously ferromagnetic and ferroelectric. The ferroic properties will be discussed on an atomic, nano- and micro-scales so that actual and potential applications on those scales become clear. Examples of those applications will be presented.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA462 or ENMA489B.
Formerly: ENMA489B.

ENMA463 Macroprocessing of Materials (3 Credits)
Processing of modern, bulk engineering materials. Raw materials, forming, firing, finishing and joining. More emphasis on metals and ceramics than polymers.
Prerequisite: ENMA300.
Restriction: Junior standing or higher.

ENMA464 Environmental Effects on Engineering Materials (3 Credits)
Introduction to the phenomena associated with the resistance of materials to damage under severe environmental conditions. Oxidation, corrosion, stress corrosion, corrosion fatigue and radiation damage are examined from the point of view of mechanism and influence on the properties of materials. Methods of corrosion protection and criteria for selection of materials for use in radiation environments.
Prerequisite: ENMA300. Or permission of ENGR-Materials Science & Engineering department; and permission of instructor.

ENMA465 Microprocessing Materials (3 Credits)
Micro and nanoscale processing of materials. Emphasis on thin film processing for advanced technologies.
Prerequisite: ENMA300.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA363, ENMA489B, or ENMA465.
Formerly: ENMA363.

ENMA466 Advanced Materials Fabrication Laboratory (3 Credits)
This course allows students an opportunity to study advanced materials systems in depth through a combination of lectures and hands-on laboratory experiments. Students will be trained in materials processing and characterization techniques. Each student will fabricate materials and devices in our state-of-the-art nanofabrication clean room facility (Fablab), as well as evaluate them using a variety of characterization techniques.
Prerequisite: ENMA465; and permission of ENGR-Materials Science & Engineering department.

ENMA470 Materials Selection for Engineering Design (3 Credits)
Students will learn about materials classes, properties, limitations and applications and the methodology of materials selection in engineering design.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA 470 or ENMA 489O.
Formerly: ENMA 489O.

ENMA471 Kinetics, Diffusion and Phase Transformations (3 Credits)
Fundamentals of diffusion, the kinetics of reactions including nucleation and growth and phase transformations in materials.
Prerequisite: Must have completed or be concurrently enrolled in ENMA461.
Restriction: Junior standing or higher; or permission of ENGR-Materials Science & Engineering department.

ENMA472 Additive Manufacturing of Materials (3 Credits)
Additive manufacturing approaches for metals, ceramics and polymers will be explored in terms of manufacturability and how processing parameters affect microstructure and properties. The course will include projects, including a Terrapin Works project to design and build a part, to develop an understanding of the current state of additive manufacturing, its future promise and its limitations.
Prerequisite: ENMA300.
Restriction: Must be in Engineering: Materials Science program.
Credit Only Granted for: ENMA472 or ENMA672.

ENMA473 Engineering Using High Strength Metals and Alloys (3 Credits)
This is a class focused on the materials engineering challenges of applying high strength metals and alloys to solutions. The extraordinary properties of these alloys derive from (1) highly metastable microstructures, (2) high strengths and melting points of the base metals, (3) complicated processing and fabrication procedures, and (4) their resulting complex behavior in extreme environments. This course will give you the knowledge base you need to select, apply and troubleshoot the performance of high strength metals and alloys in a variety of applications.
Prerequisite: ENMA300, ENMA362, and ENMA461; and permission of ENGR-Materials Science & Engineering department.

ENMA474 Introduction to Computational Materials Science (3 Credits)
This is an introductory course aiming for junior and senior undergraduate students to study atomistic modeling and simulation techniques that are used in materials science. This course covers the theories and applications of atomistic scale modeling techniques to simulate, understand, and predict the properties of materials. Topics include: molecular statics, quantum mechanical methods, molecular dynamics simulations and Monte Carlo simulations.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA474 or ENMA489A.
Formerly: ENMA489A.

ENMA475 Fundamentals of Diffraction Techniques in Materials Science (3 Credits)
This course looks at the advanced methods of x-ray scattering/diffraction available thanks to the more powerful sources available to us. The availability of these sources enables us to study liquid crystals, polymers, nanomaterials, quasiorganized materials (including nano) and disordered materials.
Prerequisite: MATH246, PHYS270, and PHYS271.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA475 or ENMA489M.
Formerly: ENMA489M.

ENMA476 NanoManufacturing: Materials Design and Systems Integration (3 Credits)
The fundamentals of nanomanufacturing based on state-of-the-art and future prospects in materials design and systems integration. The course examines functional nanomaterials design and synthesis, structural assembly from nanoscale to macroscale, and device fabrication. Distinct from the current curricular paradigm in many nanotechnology programs that focus on underlying science, this course emphasizes the immediate need for scale-up, process robustness, and system integration issues. Featuring case studies from industry, end of chapter problems, and study questions, the course is for upper-level undergraduate and graduate students, who are interested in the future of manufacturing innovation and technology.
Restriction: Must be in Engineering: Materials Science program.

ENMA481 Introduction to Electronic and Optical Materials (3 Credits)
Electronic, optical and magnetic properties of materials. Emphasis on materials for advanced optoelectronic and magnetic devices and the relationship between properties and the processing/fabrication conditions.
Prerequisite: ENMA300; or students who have taken courses with comparable content may contact the department.

ENMA482 Introduction to Electron Microscopy (3 Credits)
An introduction of the basic principles of operation for modern electron microscopes. Details will be given on the construction of microscopes, their basic operation, and the types of questions that can be addressed with an electron microscope. Emphasis will be placed on a conceptual understanding of the underlying theories. Where appropriate, mathematical descriptions will be utilized. Upon completion of this course, students will be excepted to have a basic understanding sufficient to give interpretations of microscopy images and to suggest the correct tool or approach for certain research studies.
Prerequisite: PHYS142, PHYS122, or PHYS260.
Credit Only Granted for: ENMA482 or ENMA489J.
Formerly: ENMA489J.

ENMA484 Fundamentals of Finite Element Modeling (3 Credits)
A brief review of mechanical behavior of materials, introduction to Finite Element Modeling (FEM), and procedures for predicting mechanical behavior of materials by FEM using computer software (at present ANSYS). The FEM procedures include, setting up the model, mesh generation, data input and interpretation of the results.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA484 or ENMA489F.
Formerly: ENMA489F.

ENMA486 Seminar in Materials Science and Engineering (1 Credit)
Current research in materials science and engineering and related fields. The lectures are presented by scientists and engineers from academia, national laboratory, US government, etc., in the format of seminars.
Restriction: Must be in Engineering: Materials Science program.

ENMA487 Capstone Preparation (1 Credit)
In preparation for the senior level design course, students will do background research and develop white papers from which teams will form around short listed design projects. The projects should focus on a society, industry, military or technological based problem in Materials Science and Engineering leading to a design and strategy to address the problem in the following course, ENMA 490. The course will include written and oral presentations of the white papers and team proposals.
Restriction: Must be in Engineering: Materials Science program; and senior standing; and permission of ENGR-Materials Science & Engineering department.

ENMA489 Selected Topics in Engineering Materials (3 Credits)
Selected topics of current importance in materials science and engineering.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Repeatable to: 12 credits if content differs.

ENMA490 Materials Design (3 Credits)
Capstone design course. Students work in teams on projects evaluating a society or industry based materials problem and then design and evaluate a strategy to minimize or eliminate the problem; includes written and oral presentations.
Prerequisite: Minimum grade of C- in ENMA487.
Restriction: Senior standing.

ENMA495 Polymeric Engineering Materials I (3 Credits)
Study of polymeric engineering materials and the relationship to structural type. Elasticity, viscoelasticity, anelasticity and plasticity of single and multiphase materials. Emphasis is on polymetric materials.
Prerequisite: ENMA300.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA496 Processing and Engineering of Polymers (3 Credits)
A comprehensive analysis of processing and engineering techniques for the conversion of polymeric materials into useful products. Evaluation of the performance of polymer processes, design of polymer processing equipment, effect of processing on the structure and properties of polymeric materials.
Prerequisite: ENMA300; and permission of ENGR-Materials Science & Engineering department.

ENMA499 Senior Laboratory Project (1-3 Credits)
Students work with a faculty member on an individual laboratory project in one or more of the areas of engineering materials. Students will design and carry out experiments, interpret data and prepare a comprehensive laboratory report.
Restriction: Senior standing.

ENMA600 Advanced Atomistic Modeling in Materials (3 Credits)
This is an advanced course designed to study atomistic modeling and simulation techniques used in materials research. This course covers the theories, methods, and applications of atomistic-scale modeling techniques in simulating, understanding, and predicting the properties of materials. Specific topics include: molecular statics using empirical force fields; quantum mechanical methods including density functional theory; molecular dynamics simulations; and Monte Carlo and kinetic Monte Carlo modeling.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA600, ENMA 698A, ENMA400 or ENMA489A.
Formerly: ENMA698A.

ENMA613 Materials Science of Quantum Computing (3 Credits)
Quantum computing is the emerging field that attempts to perform information processing on a quantum mechanical state (qubit). This graduate level course targets advanced undergraduate and beginning graduate students for an introduction to this field of applied physics and the related material structures needed for elementary quantum computing. This course focuses on targeted topics of quantum mechanics and solid state physics as applicable to ion trap qubits, electron spin qubits, and superconducting qubits with connections to actual material structures their design and means of fabrication.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Recommended: Strongly recommended coursework in introduction to materials science, electronic materials, solid state physics, quantum mechanics and basic knowledge in computer programming or MATLAB.

ENMA614 Advanced Solid State Ionics (3 Credits)
Advanced solid state ionics is the higher level study of point defects in crystalline and non-crystalline solids; defect equilibria and transport; the influence of chemical and electric potentials, interfaces, and association; and the application of ionically conducting solids in solid-state electrochemical transducer systems and devices.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA 614 or ENMA 698W.
Formerly: ENMA 698W.

ENMA615 Advanced Archeology meets Technology (3 Credits)
Focus on the application of scientific methods of analysis to archaeological materials including bone, stone, pottery, and metal. Methods include absolute dating, remote sensing, optical and SEM microscopy, elemental and isotopic analysis. Laboratory sections provide hands-on experience with a variety of archaeological materials and analytical methods.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Recommended: Some knowledge of archaeology and archaeological methods, geology or chemistry is useful, but not required.

ENMA620 Polymer Physics (3 Credits)
The thermodynamics, structure, morphology and properties of polymers. Developing an understanding of the relationships between theory and observed behavior in polymeric materials.
Prerequisite: ENMA471; or permission of instructor.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA621 Advanced Design Composite Materials (3 Credits)
Fundamentals of design, processing, and selection of composite materials for structural applications are covered. The topics include a review of all classes of engineering materials, an in-depth analysis of micro and macro mechanical behavior including interactions at the two-phase interfaces, modeling of composite morphologies for optimal microstructures, material aspects, cost considerations, processing methods- including consideration of chemical reactions, stability of the interfaces and material selection.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA621 or ENMA698A.
Formerly: ENMA698A.

ENMA624 Radiation Engineering (3 Credits)
Ionizing radiation, radiation dosimetry and sensors, radiation processing, radiation effects on ; polymers, metals, semiconductors, liquid, and gas, radiation in advance manufacturing, radiation-physical technology.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA624 or ENMA698E.
Formerly: ENMA698E.

ENMA625 Biomaterials (3 Credits)
Examination of materials used in humans and other biological systems in terms of the relationships between structure, fundamental properties and functional behavior. Replacement materials such as implants, assistive devices such as insulin pumps and pacemakers, drug delivery systems, biosensors, engineered materials such as artificial skin and bone growth scaffolds, and biocompatibility will be covered.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA425, ENMA698I, BIOE698I, or ENBE453.
Formerly: ENMA698I.

ENMA626 Fundamentals of Failure Mechanisms (3 Credits)
Advanced failure mechanisms in reliability engineering wiil be taught from a basic materials and defects point of view. The methods of predicting the physics of failure of devices, materials, components and systems are reviewed. The main emphasis will be given to basic degradation mechanisms through understanding the physics, chemistry, and mechanics of such mechanisms. Mechanical failures are introduced through understanding fatigue, creep and yielding in materials, devices and components. The principles of cumulative damage and mechanical yielding theory are taught. The concepts of reliability growth, accelerated life testing, environmental testing are introduced. Physical, chemical and thermal related failures are introduced through a basic understanding of degradation mechanisms such as diffusion, electromigration, defects and defect migration. The failure mechanisms in basic material types will be taught. Failure mechanisms observed in real electronic devices and electronic packaging will also be presented. Problems related to manufacturing, and microelectronics will be analyzed. Mechanical failures are emphasized from the point of view of complex fatigue theory.
Restriction: Permission of ENGR-Mechanical Engineering. Cross-listed with: ENRE600.
Credit Only Granted for: ENMA626, ENMA698M, ENMA698R, or ENRE600.

ENMA627 Nanotechnology Characterization (3 Credits)
Techniques to characterize the properties of materials whose characteristic dimensions are a few to a few hundred nanometers, including "conventional" nanocrystalline materials, but concentrating on "novel" nanomaterials: carbon nanotubes, quantum dots, quantum wires, and quantum wells will be covered. The emphasis is on recent results from the scientific literature concerning those properties that make nanostructures interesting: quantum effects, novel transport phenomena, enhanced mechanical properties associated with localization and with small crystalline size.
Credit Only Granted for: ENMA627 or ENME698T.
Formerly: ENMA698T.

ENMA630 Advanced Nanosized Materials: Synthesis and Utilization (3 Credits)
This course covers fundamental theory and fabrication-related aspects of nanoscale materials science. Topics: Quantization of energy level in solids and its effect on properties. Nucleation, growth and aging. Nano-epitaxy. Anisotropic crystal engineering. Electrical Transport. Nano-magnetism. Properties of carbon nanotubes. Applications in electronics, optics, data storage, energy and biomedicine.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA630 or ENMA6998G.
Formerly: ENMA698G.

ENMA631 Advanced Nanomechanics of Biomaterials (3 Credits)
Students will develop understanding of the latest scientific developments and discoveries in the nanoscale structure and properties of biological materials. Topics include nanostructures of biomaterials, physiological roles under mechanical forces, biopolymers, protein folding, and self-assembly. Also included are characterization methods of nanomechanical properties using single molecule techniques. Current applications of nanobiomaterials in the area of molecular machines, molecular self-assembly, and nanoscaffold are discussed.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA631 or ENMA698B.
Formerly: ENMA698B.

ENMA633 Advanced Characterization of Soft Matter Materials (3 Credits)
This course is focused on both the theories and experimental works of studying structure and dynamics of soft matter materials using scattering techniques (light, x-ray and neutron scattering). These scattering techniques can probe the structure from a few Angstrom to micrometer and the dynamics from picosecond to second, are thus widely used to reveal the structure-performance relationship of different materials. The course discusses the physics principles of these techniques and explains the details of general theories and commonly used models in characterizing soft matter materials such as polymer, protein, colloidal, thin film, and gel systems.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA635 Wide Bandgap Materials and Devices (3 Credits)
Presents the materials science of wide bandgap materials and analyzes the defects present in such materials from a device performance point of view.
Restriction: Permission of ENGR-Materials Science & Engineering department. Jointly offered with: ENMA435.
Credit Only Granted for: ENMA435 or ENMA635.

ENMA636 Introduction to Quantum Materials and Devices (3 Credits)
Quantum materials and devices are an emerging field in materials engineering and physics which offer new approaches to electronics and photonics. This course serves as an introduction to quantum materials and their applications in quantum technologies. It will teach concepts needed to understand the quantum mechanical properties of materials and connect their fundamental properties to quantum device applications. Topics will include low-dimensional materials, strongly correlated electron systems, topology in solids, and light-matter interactions.
Prerequisite: ENMA650 and ENMA660 .
Restriction: Permission of ENGR-Materials Science & Engineering department. Jointly offered with: ENMA436.
Credit Only Granted for: ENMA436 or ENMA636.

ENMA637 Machine Learning for Materials Science (3 Credits)
Familiarizes students with basic as well as state of the art knowledge of machine learning and its applications to materials science and engineering. Covers the range of machine learning topics with applications including feature identification and extraction, determining predictive descriptors, uncertainty analysis, and identifying the most informative experiment to perform next. One focus of the class is to build the skills necessary for developing an autonomous materials research system, where machine learning controls experiment design, execution, and analysis in a closed-loop.
Prerequisite: MATH461.
Recommended: Python knowledge.
Restriction: Permission of ENGR-Materials Science & Engineering department. Jointly offered with: ENMA437.
Credit Only Granted for: ENMA437, ENMA489L, or ENMA637.

ENMA640 Advanced Nano Processing of Materials with Plasma (3 Credits)
Plasmas are used to control the micro-and Nanoscale level structure of materials including patterning at the micro-and nanoscale level using plasma etching techniques. The course establishes the scientific understanding required for the efficient production of nano-structure using plasma techniques.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA440, ENMA489P, ENMA698P, or ENMA640.
Formerly: ENMA698P.

ENMA641 Nanotechnology Characterization (3 Credits)
Techniques to characterize the properties of materials whose characteristic dimensions are a few to a few hundred nanometers, including conventional nanocrystalline materials, but concentrating on novel nanomaterials: carbon nanotubes, quantum dots, quantum wires, and quantum wells are covered. The emphasis is on recent results from the scientific literature concerning those properties that make nanostructures interesting: quantum effects, novel transport phenomena, enhanced mechanical properties associated with localization and with small crystallite size.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA698T or ENMA641.
Formerly: ENMA698T.

ENMA642 Current Trends in Nanomaterials (3 Credits)
Presents a historical and contemporary perspective of the trends of development of nanomaterials. Having characteristic dimensions in the range of 1-100 nanometers, these materials are difficult to synthesize a nd characterize but are nevertheless at the forefront of science and tec hnology in many fields. Through detailed analysis of the current literat ure, all students will develop a sense for not only where the science an d technology has come but also where it is going.
Credit Only Granted for: ENMA642 or ENMA698N.
Formerly: ENMA698N.

ENMA643 Advanced Photonic Materials (3 Credits)
The understanding of the basic optical processes in photonic devices and systems compsed of waveguides, light emitting diodes and lasers, as well as modulators is developed. Lectures on basic degradation mechanisms of such systems will be presented. The area of organic based LED reliability will be covered from the point of view of the stability of the organic-inorganic interface.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA698Z, ENRE648Z, or ENMA643.
Formerly: ENMA698Z.

ENMA645 Advanced Liquid Crystals and Other Monomeric Soft Matter Materials (3 Credits)
Elective course on the properties and behavior of liquid crystal and related soft materials, and their relationship to biomaterials and applications.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA650 Nanometer Structure of Materials (3 Credits)
The basic concepts required for understanding nanostructured materials and their behavior will be covered. Topics covered include the structural aspects of crystalline and amorphous solids and relationships to bonding types, point and space groups. Summary of diffraction theory and practice. The reciprocal lattice. Relationships of the microscopically measured properties to crystal symmetry. Structural aspects of defects in crystalline solids.
Prerequisite: ENMA460; or students who have taken courses with comparable content may contact the department. And permission of ENGR-Materials Science & Engineering department.

ENMA659 Special Topics in Electronic Materials (3 Credits)
Topics of current interest in the design and manufacture of electronic materials.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits if content differs.

ENMA660 Thermodynamics in Materials Science (3 Credits)
Thermodynamics of engineering solids. Thermal, diffusional and mechanical interactions in macroscopic systems. Systems in thermal contact, systems in thermal and diffusive contact, systems in thermal and mechanical contact.
Corequisite: ENMA650.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA661 Kinetics of Reactions in Materials (3 Credits)
The theory of thermally activated processes in solids as applied to diffusion, nucleation and interface motion. Cooperative and diffusionless transformations. Applications selected from processes such as allotropic transformations, precipitation, martensite formation, solidification, ordering, and corrosion.
Prerequisite: ENMA660.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA662 Advanced Smart Materials (3 Credits)
This course will cover the three ferroic materials, ferromagnetic, ferroelectric, and ferroelastic (also known as Shape Memory Alloy, SMA) as well as materials that are simultaneously ferromagnetic and ferroelectric etc. Their similarities and differences will be identified and their atomic level and crystal structure examined. Phase transformations are very important and will be treated in some detail. Applications, e.g. permanent magnets, electronic magnetic materials, digital storage elements, actuators and sensors as well as SMAs for vision glasses, self-adjusting valves and the like will be covered.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA664 Advanced Environmental Effects on Engineering Materials (3 Credits)
Introduction to the phenomena associated with the resistance of materials to damage under severe environmental conditions. Oxidation, corrosion, stress corrosion, corrosion fatigue and radiation damage are examined from the point of view of mechanism and influence on the properties of materials. Methods of corrosion protection and criteria for selection of materials for use in radiation related environments.
Credit Only Granted for: ENMA664 or ENMA698K.
Formerly: ENMA698K.

ENMA669 Special Topics in the Chemical Physics of Materials (3 Credits)
Restriction: Permission of ENGR-Materials Science & Engineering department; and permission of instructor.

ENMA671 Defects in Materials (3 Credits)
Fundamental aspects of point (electronic and atomic) defects, dislocations, and surfaces and interfaces in materials. Defect interactions, defect models, and effects of zero, one and two dimensional defects on material behavior.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA674 Advanced Computational Materials Science (3 Credits)
An introduction for beginning graduate students to study atomistic modeling and simulation techniques that are used in materials science. Theories and applications of atomistic scale modeling techniques to simulate, understand, and predict the properties of materials will be covered. Topics include: molecular statics, quantum mechanical methods, molecular dynamics simulations and Monte Carlo simulations.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA674 or ENMA 698A.
Formerly: ENMA698A.

ENMA679 Special Topics in the Mechanical Behavior of Materials (3 Credits)
Topics of current interest in the mechanical behavior of materials.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA680 Determination of Structure, Chemical Composition and Defects in Materials (3 Credits)
Basic principles of electron microscopy theory, electron diffraction, and imaging theory. The electron beam sample interaction that gives rise to different signals is related to the structural and compositional information that is obtained from a sample using a TEM. The most common TEM techniques for structural characterization of a sample, namely, electron diffraction, bright/dark field imaging, and high resolution lattice imaging are discussed. Compositional information obtained from x-ray fluorescence and electron energy loss as well as the resolution of these techniques is also covered. A description of techniques used to study magnetic materials is also presented.
Prerequisite: ENMA650.
Restriction: Permission of ENGR-Materials Science & Engineering department.

ENMA681 Diffraction Techniques in Materials Science (3 Credits)
Advanced methods of x-ray scattering/diffraction available thanks to the more powerful sources available to us. The availability of these sources enables us to study liquid crystals, polymers, nanomaterials, quasiorganized materials (including nano) and disordered materials. We will consider scattering/diffraction from the electronic level and build up to the molecular level.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.

ENMA682 Electron Microscopy for Research (3 Credits)
An overview of the basic principles of operation for modern electron microscopes and how they are used in modern research. Details will be given on the construction of microscopes, their basic operation, and the types of questions that can be addressed with an electron microscope. Emphasis will be placed on a conceptual understanding of the underlying theories, and how to apply these to real-world research problems. Independent study into a specific area of electron microscopy will contribute to a term paper. Upon completion of this course, student will be expected to have a basic understanding sufficient to give interpretations of microscopy images and to suggest the correct tool or approach for certain research studies.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA682 or ENMA698J.
Formerly: ENMA698J.

ENMA683 Structural Determination Laboratory (1 Credit)
The operation of an electron microscope is covered. TEM techniques that are used to characterize the structure, defects and composition of a sample are presented and used to study a variety of materials. These techniques are: electron diffraction patterns, bright/dark field imaging, high resolution lattic imaging and energy dispersive x-ray spectroscopy. Also covers different sample preparation techniques for TEM. The goal is that the students become independent users of the TEM.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA698L or ENMA683.
Formerly: ENMA698L.

ENMA684 Advanced Finite Element Modeling (3 Credits)
A brief review of mechanical behavior of materials, introduction to Finite Element Modeling (FEM), and procedures for predicting mechanical behavior of materials by FEM using computer software (at present ANSYS). The FEM procedures include, setting up the model, mesh generation, data input and interpretation of the results.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Credit Only Granted for: ENMA684 or ENMA698I.
Formerly: ENMA698I.

ENMA685 Advanced Electrical and Optical Materials (3 Credits)
Students become familiar with basic and state of the art knowledge of some technologically relevent topics in materials engineering and applied physics, including dielectric/ferroelectric materials, magnetic materials, superconductors, multiferroic materials and optical materials with an underlying emphasis on the thin film and device fabrication technology. Fundamental physical properties and descriptions of different materials and their applications are included. Discussion will include new developments in the fields.
Credit Only Granted for: ENMA685 or ENMA698F.
Formerly: ENMA698F.

ENMA687 Nanoscale Photonics and Applications (3 Credits)
Advanced topics in photonics including optical ray propogation, LEDS and the interaction of light in nanostructured materials for optoelectronic applications will be covered.
Credit Only Granted for: ENMA687 or ENMA698Z.
Formerly: ENMA698Z.

ENMA688 Seminar in Materials Science and Engineering (1 Credit)
Current research in materials science and engineering and related fields.
Restriction: Must be in Engineering: Materials Science program.
Repeatable to: 4 credits if content differs.
Formerly: ENMA697.

ENMA689 Special Topics in Engineering Materials (3 Credits)
Restriction: Permission of instructor; and permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits if content differs.
Formerly: ENMA691.

ENMA698 Special Problems in Materials Science and Engineering (1-3 Credits)
Individual, supervised study in materials science and engineering.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits if content differs.

ENMA797 Independent Study (3 Credits)
This course is designed to provide students with a directed independent study course in order to prepare the scholarly paper required for the master's degree without thesis degree option.

ENMA799 Master's Thesis Research (1-6 Credits)

ENMA808 Advanced Topics in Engineering Materials (3 Credits)
Restriction: Permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits if content differs.

ENMA898 Pre-Candidacy Research (1-8 Credits)

ENMA899 Doctoral Dissertation Research (1-8 Credits)

ENME - Engineering, Mechanical

ENME400 Machine Design (3 Credits)
Design of mechanical elements and planar machines. Failure theories. Design of pressure vessels, joints, rotating elements, and transmission elements. Kinematic structures, graphical, analytical, and numerical analysis and synthesis of linkages, gear trains, and flywheels are covered.
Prerequisite: Must have completed or be concurrently enrolled in ENME361.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME406 Roller Coaster Engineering (3 Credits)
Engineering of roller coasters including: specifications, concept creation, structural design, car design, and safety. Course covers biomechanics and rider kinematics as well as manufacturing aspects.
Prerequisite: ENES220, ENES221, and ENME272. And ENME202; or MATH206.
Corequisite: ENME400.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME407 Sustainability, Climate Change and Renewable Energy Systems (3 Credits)
Countries around the world are developing innovative and sustainable solutions that not only help to protect the environment from the threats of global climate change, but that also can improve human health and quality of life. In this course students will explore solutions to climate change, as well as geothermal and hydroelectric energy systems and their applications.
Prerequisite: PHYS260; or permission of ENGR-Mechanical Engineering department.
Restriction: Students must have completed a minimum of 60 credits by the time they will enroll in this course.

ENME408 Selected Topics in Engineering Design (3 Credits)
Creativity and innovation in design. Generalized performance analysis, reliability and optimization as applied to the design of components and engineering systems. Use of computers in design of multivariable systems.
Restriction: Must be in Engineering: Mechanical program; and senior standing. Or permission of ENGR-Mechanical Engineering department.
Repeatable to: 6 credits if content differs.

ENME410 Design Optimization (3 Credits)
Introduction to the formal process of design optimization, including analytical and computational methods. Step by step design optimization techniques. Design optimization concepts, necessary and sufficient optimality conditions and solution techniques. Solution evaluation and tradeoff exploration.
Prerequisite: ENME271; or MATH206.
Restriction: Permission of ENGR-Mechanical Engineering department; and junior or senior standing.

ENME414 Computer-Aided Design (3 Credits)
Introduction to computer graphics. Plotting and drawing with computer software. Principles of writing interactive software. The applications of computer graphics in computer-aided design. Computer-aided design project.
Prerequisite: MATH241; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: ENME 414 or ENME272.

ENME416 Additive Manufacturing (3 Credits)
Develop a comprehensive understanding of fundamental additive manufacturing, 3D printing approaches, including: extrusion-based deposition, stereolithography, powder bed-based melting, and inkjet-based deposition. Cultivate a design for-additive manufacturing skillset for CAD and CAM methodologies to produce successful 3D prints. Fabricate 3D mechanical objects using a variety of 3D printing technologies on campus. Execute a design project that demonstrates how additive manufacturing technologies can overcome critical limitations of traditional manufacturing processes.
Prerequisite: ENME331. And ENME272; or ENME414.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME421 Engineering Design Ideation (3 Credits)
Engineering Design Methods is a technical elective for engineering students who wish to improve their ability to produce design ideas (i.e., the ideation process) for further development into conceptual ideas. Ideation is the creative, idea generation activity that happens at the beginning of the conceptual design process. Ideation methods are often built around creativity improving strategies and are often designed for individual use prior to presenting the results in a team setting.
Prerequisite: Must have completed or be concurrently enrolled in ENME371.
Restriction: Junior standing or higher.
Additional Information: Ideally, this course should be taken prior to capstone design.

ENME422 Indoor Environment and Mechanical Systems (3 Credits)
Fundamentals of indoor air quality and its measurements. Exploration of air cleaning technologies for gaseous, particulate and infectious agent contaminants. Simulations of air flow and contaminants with multi-zone models to allow testing of both contaminant dispersion in buildings and effectiveness of air cleaning technologies.
Prerequisite: ENES232 and ENME332. Jointly offered with: ENME753.
Credit Only Granted for: ENME422 or ENME753.

ENME423 Modern Climate Control and Building Energy Design/Analysis (3 Credits)
Fundamentals and design calculations of heat and moisture transfer in buildings; evaluation of cooling, heating and power requirements of buildings; building energy consumption simulations, use of alternative energy and energy conservation measures in buildings; fundamentals of fans/pumps and air/water distribution in buildings; introduction to refrigeration and energy systems for data centers and other mission-critical facilities.
Prerequisite: ENES232.
Corequisite: ENME332.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME424 Urban Microclimate and Energy (3 Credits)
Urban microclimate from the perspective of transient heat and mass transfer using building energy simulations for building clusters as well as LEED building certification criteria. The focus is on understanding building energy consumption and environmental impacts from the individual building scale to a neighborhood scale.
Prerequisite: Must have completed or be concurrently enrolled in ENME332.
Recommended: ENME423.
Restriction: Permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENME424 or ENME808I.

ENME426 Production Management (3 Credits)
The basic concepts and models needed to understand and design manufacturing systems, including the history of manufacturing, performance measures, queuing systems, variability, production planning and scheduling, lean manufacturing, and pull production control.
Credit Only Granted for: BMGT385 or ENME426.

ENME427 CSI Mechanical: Finding Reasons for Compromised Structural Integity (3 Credits)
Understanding the causes of product failures including the political, societal, economic, environmental, and ethical impact of these failures, and the strategies to avoid, postpone, or mitigate them. Students will be encouraged to combine concepts from engineering, natural sciences, social sciences, and the humanities to address these complex issues. Basics of failure analysis, forensics, and reliability engineering and the scientific fundamentals underlying the most common types of failure. Issues of legal liability. Methods for monitoring the existing condition of a structure.
Prerequisite: ENES220 and ENME382.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME430 Fundamentals of Nuclear Reactor Engineering (3 Credits)
Fundamental aspects of nuclear physics and nuclear engineering, including nuclear interactions; various types of radiation and their effects on materials and humans; and basic reactor physics topics, including simplified theory of reactor critically.
Prerequisite: MATH246.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME431 Nuclear Reactor Systems and Safety (3 Credits)
Engineering, material and thermal aspects of light water reactors, fast reactors, high temperature gas reactors, heavy water moderated reactors, breeder reactors, advanced reactors including GEN IV designs. Evolution of light water reactor safety and regulation in the US that has culminated in the current body of regulations.
Prerequisite: MATH246.
Recommended: ENME430.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME432 Reactor and Radiation Measurements Laboratory (3 Credits)
Basics concepts of nuclear radiation and radiation detectors including types of radiation, radioactive decay, and interactions of radiation with matter.
Prerequisite: ENME430 and MATH246.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME436 Renewable Energy (3 Credits)
Fundamentals, design/analysis tools, and state of the art renewable energy technologies. Energy resources and global perspectives of current and future energy demand/consumption trends, followed by prime renewable energy technologies, including wind, solar, hydro, geothermal, and ocean thermal energy conversion. Economics of renewable energy, energy conservation opportunities, CO2 capture and storage, and thermal energy storage.
Prerequisite: ENME331.
Restriction: Must be in a major within the ENGR-Mechanical Engineering department.
Credit Only Granted for: ENME489K or ENME436.
Formerly: ENME489K.

ENME440 Applied Machine Learning for Engineering and Design (3 Credits)
Learn how to apply techniques from Artificial Intelligence and Machine Learning to solve engineering problems and design new products or systems. Design and build a personal or research project that demonstrates how computational learning algorithms can solve difficult tasks in areas you are interested in. Master how to interpret and transfer state-of-the-art techniques from computer science to practical engineering situations and make smart implementation decisions.
Prerequisite: ENME392; or permission of instructor.
Restriction: Permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENME440, ENME808E, or ENME743.

ENME441 Mechatronics and the Internet of Things (3 Credits)
Mechatronics integrates dynamical systems, transducers, computation, control and design. Students will gain experience with digital circuit development, mechatronics design and participate in labs and projects culminating in the development of a mobile robotic platform. Course aims to reveal the dynamic nature of mechanical components where the domains of mechanics, electronics and software converge. Project driven, hands-on course in which student will learn about the Raspberry Pi platform, wireless communication using Pi and Python code development among other skills.
Prerequisite: ENME351.
Restriction: Permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENME489B or ENME441.
Formerly: ENME489B.

ENME442 Information Security (3 Credits)
The materials presented are divided into three major components: overview, detailed concepts and implementation techniques. The topics to be covered are: general security concerns and concepts from both a technical and management point of view, principles of security, architectures, access control and multi-level security, trojan horses, covert channels, trap doors, hardware security mechanism, security models, security kernels, formal specifications and verification, networks and distribution systems and risk analysis.
Restriction: Must have Senior standing in engineering; and permission of ENGR-Mechanical Engineering department. Jointly offered with ENRE684 .
Credit Only Granted for: ENRE648J, ENME442, ENRE684, or ENPM808E.

ENME444 Assistive Robotics (3 Credits)
Fundamentals of assistive robots used in a wide varietyof ways to help humans with disabilities. Three application areas will be covered: (1) Rehabilitation robotics to recover motor function from neurologic injuries such as stroke, (2) Prosthetics to enable mobility function in amputees, and (3) Social robotics for cognitive impairment and developmental disorders such as autism. Theory behind different control systems employed by assistive robotics, as well as the mechanical design, sensors & actuators, and user interfaces behind representative robots in the respective areas. Guidelines for designing assistive robots. Ethical and regulatory considerations in the design of assistive robots.
Prerequisite: ENME351; and must have completed or be concurrently enrolled in ENME462.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME445 Design for Reliability (3 Credits)
Failure prevention, accident prevention, design requirements analysis, designing right the first time, high system reliability, software reliability, manufacturing defect prevention, life cycle costs reduction, design reviews, managing the design for reliability, design trustworthiness, product durability, and writing good specifications are covered.
Restriction: Junior standing or higher.

ENME446 Medical Robotics (3 Credits)
The fundamentals of robot design, control and different areas of research regarding development are explored. Student will engage in a course project where they will learn to develop, build, and control a medical robot. Surgical robotics development and modeling of robotic systems, safety in medical robotics, haptics, ergonomics and surgery. Fundamentals of robot design and control. Kinematics. This proposal was approved through the Testudo Curriculum Management system.
Prerequisite: Must have completed or be concurrently enrolled in ENME361.
Restriction: Permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENME489C, ENME808M or ENME446.
Formerly: ENME489C.

ENME454 Vehicle Dynamics (3 Credits)
The fundamentals of passenger vehicle and light truck design and vehicle dynamics are covered. The engineering principles associated with acceleration, braking, handling, ride quality, aerodynamics, and tire mechanics are discussed, as well as suspension and steering design.
Corequisite: ENME361.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME461 Control Systems Laboratory (3 Credits)
Students will design, implement, and test controllers for a variety of systems. This will enhance their understanding of feedback control familiarize them with the characteristics and limitations of real control devices. Students will also complete a small project. This will entail writing a proposal, purchasing parts for their controller, building the system, testing it, and writing a final report describing what they have done.
Prerequisite: ENME351 and ENME361.
Restriction: Permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENEE461 or ENME461.

ENME462 Vibrations, Controls, and Optimization II (3 Credits)
Continuation of ENME361. Fundamentals of vibration, controls, and optimization. Analysis and design in time, Laplace and frequency domains. Mathematical descriptions of system response, system stability, control and optimization. Optimal design of mechanical systems.
Prerequisite: ENME361.
Restriction: Permission of the Mechanical Engineering Department.

ENME464 Cost Analysis for Engineers (3 Credits)
An introduction to the financial and cost analysis aspects of product engineering. Introduces key elements of traditional engineering economics including interest, present worth, depreciation, taxes, inflation, financial statement analysis, and return on investment. Provides an introduction to cost modeling as it applies to product manufacturing and support. Cost modeling topics will include: manufacturing cost analysis, life-cycle cost modeling (reliability and warranty), and cost of ownership.
Prerequisite: ENME392; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME465 Probability-Based Design (3 Credits)
Review of probabilistic distributions, introduction to pseudo-random number generation, and algorithms to produce probability distributions using Monte Carlo simulation via Matlab and other approaches to best design probabilistic engineering problems.
Prerequisite: MATH206 and ENME392.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME466 Lean Six Sigma (3 Credits)
This course intends to provide in-depth understanding of Lean Six Sigma and its Define - Mearsure - Analyze - Improve - Control (DMAIC) Breakthrough Improvement Strategy. The emphasis is placed on the DMAIC process which is reinforced via application of semester long corporate projects and case study analysis.
Corequisite: ENME392; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of ENGR-Mechanical Engineering department.

ENME467 Engineering for Social Change (3 Credits)
Critical analysis of issues at the intersection of engineering, philanthropy and social change. How engineering design, products and processes have created social change in the past and will do so in the future through both intended and unintended consequences. Topics covered include energy, sustainability and climate change, autonomy, the digital future, low cost engineering, manufacturing, philanthropy, ethics and the impact of electronics on society, among others. Faculty and external experts will engage with students on these topics. Students will broadly engage with organizations involved in using technology for positive social impact.
Restriction: Must not be in Engineering: Mechanical program; and junior standing or higher; and must be in a major in ENGR-A. James Clark School of Engineering. Cross-listed with: ENES467.
Credit Only Granted for: ENES467 or ENME467.

ENME470 Finite Element Analysis (3 Credits)
Basic concepts of the theory of the finite element method. Applications in solid mechanics and heat transfer.
Restriction: Senior standing; and permission of ENGR-Mechanical Engineering department.

ENME472 Integrated Product and Process Development (3 Credits)
Integration of product development with the development process. Design strategies. Product architecture. Design for manufacturing. Selection of materials. Design for assembly.
Prerequisite: ENME331, ENME361, ENME351, and ENME371; and must have completed or be concurrently enrolled in ENME332.
Restriction: Permission of the Department of Mechanical Engineering.

ENME473 Mechanical Design of Electronic Systems (3 Credits)
Design considerations in the packaging of electronic systems. Production of circuit boards and design of electronic assemblies. Vibration, shock, fatigue and thermal considerations.

ENME476 Mircoelectromechanical Systems (MEMS) I (3 Credits)
Fundamentals of microelectromechanical systems (MEMS). Introduction to transducers and markets. MEMS fabrication processes and materials, including bulk micromachining, wet etching, dry etching, surface micromachining, sacrificial layers, film deposition, bonding, and non-traditional micromachining. Introduction to the relevant solid state physics, including crystal lattices, band structure, semiconductors, and doping. The laboratory covers safety, photolithography, profilometry, wet etching.
Restriction: Senior standing.
Credit Only Granted for: ENME476 or ENME489F.
Formerly: ENME489F.

ENME477 Microelectromechanical Systems (MEMS) II (3 Credits)
Fabrication of devices designed in MEMS I, including everything from mask printing through training on state-of-the-art fabrication equipment through device testing. In-depth understanding of MEMS devices and technologies, such as mechanical and electromagnetic transducers, microfluidics, and chemical sensors.
Prerequisite: ENME476.

ENME480 Introduction to Robotics (3 Credits)
An introductory course in robotics that will educate students in the elementary concepts of robotics. The course will encompass both theory and experiments.
Prerequisite: MATH246 or ENES221; and (CMSC131, ENME202, ENAE202 or ENEE150).
Restriction: Must be in the Robotics and Autonomous Systems minor; or Permission of ENGR-Mechanical Engineering department.

ENME483 Physics of Turbulent Flow (3 Credits)
Specific problems of turbulent flow including automobile and truck aerodynamics and canonical flows including pipes, jets and boundary layers that are measured and simulated to gain basic understanding of turbulence. A goal of the course is to impart the necessary background for students to be able to critically assess and most effectively employ the turbulent flow prediction codes (e.g. Fluent) that are a mainstay of how turbulence is analyzed in modern industries.
Prerequisite: ENME331.
Restriction: Permission of ENGR-Mechanical Engineering department. Jointly offered with ENME656. Credit only gran ted for: ENME483 or ENME656.

ENME484 Analysis of Turbulent Flow (3 Credits)
Relentless growth in the speed and size of supercomputers has encouraged the ever expanding use of numerical simulation in the practice of fluids engineering. For the flow past ground vehicles, in the urban grid, re-entering rockets, helicopters landing on ships at sea and countless other examples, the flow is turbulent, and simulation is becoming or will one day become the methodology of choice in analyzing and designing such technologies. The goal of this course is to give an introduction to the analysis of turbulent flow via simulation and the modeling that is used in its development. Among the questions to be considered: What can one hope to learn from flow simulation? What are the strengths of the approach and what obstacles inhibit its application? What kind of physical considerations are required in setting up simulations? How does one analyze the results of a simulation?
Prerequisite: ENME331.
Restriction: Permission of ENGR-Mechanical Engineering department. Jointly offered with ENME657. Credit only gran ted for: ENME484 or ENME657.

ENME486 Computational Modeling, Simulation, and Interactive Visualization (3 Credits)
Creation of interactive graphic displays from the numerical simulation of mechanical engineering models. Brief description of each model provided, along with varied parameters to explore models' characteristics. Conclusions drawn from use of each interactive graphic. Mathematica language introduced and interwoven with the numerical simulation of the models, which will include: robotics and mechanisms, static response of beams, control systems, measurement systems, fluid flow, vibrations, geometric modeling, finite element analysis, and nonlinear phenomena.
Restriction: Senior standing; and permission of ENGR-Mechanical Engineering department.

ENME488 Special Problems (3 Credits)
Advanced problems in mechanical engineering with special emphasis on mathematical and experimental methods.
Restriction: Permission of ENGR-Mechanical Engineering department.
Repeatable to: 6 credits if content differs.

ENME489 Special Topics in Mechanical Engineering (3 Credits)
Selected topics of current importance in mechanical engineering.
Restriction: Permission of ENGR-Mechanical Engineering department.
Repeatable to: 6 credits.

ENME600 Engineering Design Methods (3 Credits)
An introductory graduate level course in critical thinking about formal methods for design in Mechanical Engineering. Course participants gain background on these methods and the creative potential each offers to designers. Participants will formulate, present, and discuss their own opinions on the value and appropriate use of design materials for mechanical engineering.

ENME605 Advanced Systems Control (3 Credits)
Modern control theory for both continuous and discrete systems. State space representation is reviewed and the concepts of controllability and observability are discussed. Design methods of deterministic observers are presented and optimal control theory is formulated. Control techniques for modifying system characteristics are discussed.
Prerequisite: ENME462; or permission of instructor.

ENME607 Engineering Decision Making and Risk Management (3 Credits)
Individual decision-making, group decisionmaking, and organizations of decision-makers in the context of engineering design, project management, and other functions. Techniques for making better decisions, for understanding how decisions are related to each other, and for managing risk.Cross-listed with ENRE671.
Credit Only Granted for: ENME808X, ENRE671 or ENME607.
Formerly: ENME 808X.

ENME610 Engineering Optimization (3 Credits)
Overview of applied single- and multi- objective optimization and decision making concepts and techniques with applications in engineering design and/or manufacturing problems. Topics include formulation examples, concepts, optimality conditions, unconstrained/constrained methods, and post-optimality sensitivity analysis. Students are expected to work on a semester-long real-world multi-objective engineering project.

ENME611 Fiber Optics (3 Credits)
Introduces students to fiber optics, provides a background including fiber optic components and terminology, and equip students with ability to understand and evaluate various kinds of fiber optic sensors for a wide range of applications along with a detailed understanding of relevant signal processing and analysis techniques.
Credit Only Granted for: ENME611,ENME808 or ENME489R.
Formerly: ENME808R.

ENME625 Multidisciplinary Optimization (3 Credits)
Overview of single- and multi-level design optimization concepts and techniques with emphasis on multidisciplinary engineering design problems. Topics include single and multilevel optimality conditions, hierarchic and nonhierarchic modes and multilevel post optimality sensitivity analysis. Students are expected to work on a semester-long project.

ENME631 Advanced Conduction and Radiation Heat Transfer (3 Credits)
Theory of conduction and radiation. Diffused and directional, poly- and mono-chromatic sources. Quantitative optics. Radiation in enclosures. Participating media. Integrodifferential equations. Multidimensional, transient and steady-state conduction. Phase change. Coordinate system transformations.
Prerequisite: ENME332; or students who have taken courses with comparable content may contact the department; or permission of instructor.

ENME632 Advanced Convection Heat Transfer (3 Credits)
Statement of conservation of mass, momentum and energy. Laminar and turbulent heat transfer in ducts, separated flows, and natural convection. Heat and mass transfer in laminar boundary layers. Nucleate boiling, film boiling, Leidenfrost transition and critical heat flux. Interfacial phase change processes; evaporation, condensation, industrial applications such as cooling towers, condensers. Heat exchangers design.
Credit Only Granted for: ENNU615 or ENME632.

ENME633 Molecular Thermodynamics (3 Credits)
An examination of the interactions between molecules, which govern thermodynamics relevant to engineering, will be conducted. We will investigate both classical and statistical approaches to thermodynamics for understanding topics such as phase change, wetting of surfaces, chemical reactions, adsorption, and electrochemical processes. Statistical approaches and molecular simulation tools will be studied to understand how molecular analysis can be translated to macroscopic phenomena.

ENME635 Energy Systems Analysis (3 Credits)
Rankine cycles with nonazeotropic working fluid mixtures, two-, multi- and variable-stage absorption cycles and vapor compression cycles with solution circuits. Power generation cycles with working fluid mixtures. Development of rules for finding all possible cycles suiting a given application or the selection of the best alternatives.
Credit Only Granted for: ENPM635 or ENME635.

ENME640 Fundamentals of Fluid Mechanics (3 Credits)
Equations governing the conservation of mass, momentum, vorticity and energy in fluid flows. Low Reynolds number flows. Boundary layers. The equations are illustrated by analyzing a number of simple flows. Emphasis is placed on physical understanding to facilitate the study of advanced topics in fluid mechanics.
Prerequisite: Must have completed partial differential equations at the level of MATH 462; or permission of ENGR-Mechanical Engineering department.
Formerly: ENME651.

ENME641 Viscous Flow (3 Credits)
Fluid flows where viscous effects play a significant role. Examples of steady and unsteady flows with exact solutions to the Navier-Stokes equations. Boundary layer theory. Stability of laminar flows and their transition to turbulence.
Prerequisite: ENME640; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Formerly: ENME652.

ENME642 Hydrodynamics I (3 Credits)
Exposition of classical and current methods used in analysis of inviscid, incompressible flows.
Prerequisite: ENME640; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Formerly: ENME653.

ENME644 Fundamentals of Acoustics (3 Credits)
This course will cover the fundamental principles of acoustics allowing the students to go on to more advanced course in acoustics, sauch as Underwater Sound Propagation, Active Noise Control, or Radiation and Scattering from Elastic Structures.

ENME646 Computational Fluid Dynamics (3 Credits)
Fundamentals of numerical analysis of engineers. Inversion of large, sparse matrices. Numerical solution of the incompressible Navier-Stokes equations in Cartesian and curvilinear grids. Application to turbulent flows and micro-fluidics.
Prerequisite: Must have completed graduate-level fluid mechanics; or permission of instructor.

ENME647 Multiphase Flow and Heat Transfer (3 Credits)
Boiling and condensation in stationary systems, phase change heat transfer phenomenology, analysis and correlations. Fundamentals of two-phase flow natural circulation in thermal hydraulic multi-loop systems with applications to nuclear reactors safety. Multiphase flow fundamentals. Critical flow rates. Convective boiling and condensation. Multiphase flow and heat transfer applications in power and process industries.

ENME656 Physics of Turbulent Flow (3 Credits)
Definition of turbulence and its physical manifestations. Statistical methods and the transport equations for turbulence quantities. Laboratory measurement and computer simulation methods. Isotropic turbulence. Physics of turbulent shear flows.
Prerequisite: ENME640; or students who have taken courses with comparable content may contact the department; or permission of instructor.

ENME657 Analysis of Turbulent Flow (3 Credits)
Mathematical representation of turbulent transport, production and dissipation. Closure schemes for predicting flows. Recent advances in direct and large eddy numerical simulation techniques.
Prerequisite: ENME640; and (ENME641; or students who have taken courses with comparable content may contact the department). Or permission of instructor.

ENME662 Linear Vibrations (3 Credits)
Development of equations governing small oscillations and spatially continuous systems. Newton's equations, Hamilton's principle, and Lagrange's equations. Free and forced vibrations of mechanical systems. Modal analysis. Finite element discretization and reductions of continuous systems. Numerical methods. Random vibrations.

ENME664 Dynamics (3 Credits)
Kinematics in plane and space; Dynamics of particle, system of particles, and rigid bodies. Holonomic and non-holonomic constraints. Newton's equations, D'Alembert's principle, Hamilton's principle, and equations of Lagrange. Impact and collisions. Stability of equilibria.
Prerequisite: ENES221; or students who have taken courses with comparable content may contact the department; or permission of instructor.

ENME665 Nonlinear Oscillations (3 Credits)
Nonlinear oscillations and dynamics of mechanical and structural systems. Classical methods, geometrical, computational and analytical methods. Birfurcations of equillibrium and periodic solutions; chaos.
Prerequisite: ENME662 and ENME 700; or equivalent.

ENME670 Continuum Mechanics (3 Credits)
Mechanics of deformable bodies, finite deformation and strain measures, kinematics of continua and global and local balance laws. Thermodynamics of continua, first and second laws. Introduction to constitutive theory for elastic solids, viscous fluids and memory dependent materials. Examples of exact solutions for linear and hyper elastic solids and Stokesian fluids.

ENME672 Composite Materials (3 Credits)
Micromechanics of advanced composites with passive and active reinforcements, mathematical models and engineering implications, effective properties and damage mechanics, recent advances in "adaptive" or "smart" composites.

ENME674 Finite Element Methods (3 Credits)
Theory and application of finite element methods for mechanical engineering problems such as stress analysis. Basic development of the method for solving the types of governing partial differential equations that are the foundations for many engineering and physical sciences. The emphasis is on balancing the theoretical/mathematical background with a computable implementation to reach applications. Some code writing and debugging will be involved. This class is suited for graduate students or high-achieving undergraduates in engineering, mathematics, or the physical sciences. A very basic knowledge of matrix-vector calculations and multivariable calculus are required. Some exposure to partial differential equations and experience with Matlab or a compiled language will be helpful but are not required.
Restriction: Must be in one of the following programs (ENGR: MS/PhDMechanical Engineering (Master's); ENGR: MS/PhDMechanical Engineering (Doctoral)) ; or permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENME 674, ENAE652, ENPM652 or ENPM808F.

ENME675 A Mathematical Introduction to Robotics (3 Credits)
Designed to provide graduate students with some of the concepts in robotics from a mathematical viewpoint, including introduction to group theory and basics of SO(3) and SE(3) group applied to robotics; rigid body motion; manipulator kinematics; introduction to holonomic & non-holonomic constraints; dynamics of robot manipulators.
Credit Only Granted for: ENME675 or ENME808V.
Formerly: ENME808V.

ENME678 Fracture Mechanics (3 Credits)
An advanced treatment of fracture mechanics covering in detail the analysis concepts for determining the stress intensity factors for various types of cracks. Advanced experimental methods for evaluation of materials or structures for fracture toughness. Analysis of moving cracks and the statistical analysis of fracture strength. Finally, illustrative fracture control plans are treated to show the engineering applications of fracture mechanics.

ENME680 Experimental Mechanics (3 Credits)
Advanced methods of measurement in solid and fluid mechanics. Scientific photography, moire, photoelasticity, strain gages, interferometry, holography, speckle, ndt techniques, shock and vibration, and laser anemometry.

ENME684 Modeling Material Behavior (3 Credits)
Constitutive equations for the response of solids to loads, heat, etc. based on the balance laws, frame invariance, and the application of thermodynamics to solids. Non-linear elasticity with heat conduction and dissipation. Linear and non-linear non-isothermal viscoelasticity with the elastic-viscoelastic correspondence principle. Classical plasticity and current viscoplasticity using internal state variables. Maxwell equal areas rule, phase change, and metastability and stability of equilibrium states. Boundary value problems. Introduction to current research areas.
Prerequisite: ENME670; or permission of instructor.

ENME690 Mechanical Fundamentals of Electronic Systems (3 Credits)
An understanding of the fundamental mechanical principles used in design of electronic devices and their integration into electronic systems will be provided. Focus will be placed on the effect of materials compatibility, thermal stress, mechanical stress, and environmental exposure on product performance, durability and cost. Both electronic devices and package assemblies will be considered. Analysis of package assemblies to understand thermal and mechanical stress effects will be emphasized through student projects.

ENME695 Design for Reliability (3 Credits)
Reliability is the ability of a product or system to perform as intended (i.e., without failure and within specified performance limits) for a specified time, in its life-cycle conditions. Knowledge of reliability concepts and principles, as well as risk assessment, mitigation and management strategies prepares engineers to contribute effectively to product development and life cycle management. This course teaches the fundamental knowledge and skills in reliability as it pertains to the design, manufacture, and use of electrical, mechanical, and electro-mechanical products. Topics cover the suitability of the supply chain members to contribute towards development, manufacturing, distribution and support of reliable products; efficient and cost-effective design and manufacture of reliable products; process capability and process control; derating, uprating, FMMEA, reliability prediction and reliability allocation; how to plan and implement product testing to assess reliability; how to analyze degradation, failure, and return data to estimate fundamental reliability parameters; root cause analysis; and reliability issues associated with warranties, regulatory requirements, and liabilities.Cross-listed with: ENRE695.
Credit Only Granted for: ENME695 or ENRE695.

ENME700 Advanced Mechanical Engineering Analysis I (3 Credits)
An advanced, unified approach to the solution of mechanical engineering problems, emphasis is on the formulation and solution of equilibrium, eigenvalue and propagation problems. Review and extension of undergraduate material in applied mathematics with emphasis on problems in heat transfer, vibrations, fluid flow and stress analysis which may be formulated and solved by classical procedures.

ENME701 Sustainable Energy Conversion and the Environment (3 Credits)
Discussion of the major sources and end-uses of energy in our society with particular emphasis on renewable energy production and utilization. Introduces a range innovative technologies and discusses them in the context of the current energy infrastructure. Renewable sources such as wind and solar are discussed in detail. Particular attention is paid to the environmental impact of the various forms of energy.
Recommended: ENME633.
Credit Only Granted for: ENME701, ENME706 or ENME808D.
Formerly: ENME706 and ENME808D.

ENME704 Active Vibration Control (3 Credits)
This course aims at introducing the basic principles of the finite element method and applying it to plain beams and beams treated with piezoelectric actuators & sensors. The basic concepts of structural parameter i dentification are presented with emphasis on Eigensystem Realization Algorithms (ERA) and Auto-regression models (AR). Different active control algorithms are then applied to beams/piezo-actuator systems. Among thes e algorithms are: direct velocity feedback, impedancematchingcontrol, modal control methods & sliding mode controllers. Particular focus is given to feedforward Leat Mean Square (LMS) algorithm & filtered-X LMS. O ptimal placement strategies of sensor & actuators are then introduced & applied to beam/piezo-actuator systems.
Prerequisite: ENME662 and ENME602; or students who have taken courses with comparable content may contact the department.
Recommended: Completion of coursework or background in Vibrations and Control recommended.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering.

ENME707 Combustion and Reacting Flow (3 Credits)
This course covers thermochemistry and chemical kinetics of reacting flows in depth. In particular, we focus on the combustion of hydrocarbonf uels in both a phenomenological and mechanistic approach. The course co vers the specifics of premixed and nonpremixed flame systems, as wellasignition and extinction. Combustion modeling with equilibrium and chemical kinetic methods will be addressed. Environmental impact and emissi ons minimization will be covered in detail. Finally, the course will co ver available combustion diagnostic methods and their application in laboratory and real-world systems.
Prerequisite: ENME331 and ENME332; or students who have taken courses with comparable content may contact the department.

ENME710 Applied Finite Elements (3 Credits)
Application of finite element methods to the solution of engineering problems - such as stress analysis, thermal conductivity, fluid flow anlaysis, electro-magnetic field analysis and coupled boundary value problems. Emphasis is on the application of the techniques to the solution of pr oblems. Basic theory is covered at beginning of course.
Prerequisite: ENME331 and ENME332.
Restriction: Must be in one of the following programs (Engineering: Mechanical; Engineering: Aerospace; Engineering: Civil).

ENME711 Vibration Damping (3 Credits)
This course aims at introducing the different damping models that describe the behavior of viscoelastic materials. Emphasis will be placedon m odeling the dynamics of simple structures (beams, plates & shells) with Passive Constrained Layer Damping (PCLD). Considerations will also be g iven to other types of surface treatments such as Magnetic Constrained Layer Damping (MCLD), Shunted Network Constrained Layer Damping (SNCLD),Active Constrained Layer Damping (ACLD) and Electrorheological Constrained Layer Damping (ECLD). Energy dissipation characteristics of the damp ing treatments will be presented analytically & by using the modal strain energy approach as applied to finite element models of vibrating structures.
Prerequisite: ENME662; or students who have taken courses with comparable content may contact the department.
Recommended: Completion of coursework or background in Vibrations recommended.
Restriction: Must be in a major in ENGR-A. James Clark School of Engineering.

ENME712 Measurement, Instrumentation and Data Analysis for Thermo-Fluid Processes (3 Credits)
This course is designed to offer systemic coverage of the methodologies for measurement and data analysis of thermal and fluid processes at the graduate level. The course materials will cover three broad categories: (1) Fundamentals of thermal and fluid processes in single phase and multi phase flows as relates to this course; Measurement and Instrumentation techniques for measurement of basic quantities such as pressure, temperature, flow rate, heat flux, etc., and (3) Experimental Design and Planning, sources of errors in measurements, and uncertainty analysis.

ENME713 Nanoparticle Aerosol Dynamics (3 Credits)
Covers the basic science of nanoparticle formation, growth, and transport; the science and engineering of measurement; and the environmental impact and industrial use of nanoparticles.
Restriction: Permission of instructor.
Credit Only Granted for: ENME713 or ENME808M.
Formerly: ENME808M.

ENME722 Equilibrium Modeling in Engineering (3 Credits)
Provide motivation and introduction to equilibrium models involving economics and engineering. We will concentrate on models involving markets (Nash-Cournot, etc.), those wherein the activities are spatially diverse, those involving energy activities or traffic flow, as well as selected other examples in mechanical engineering. Areas that will be covered include:Review of relevant optimization theory, presentation of the mixed complementarity problem (MCP) and variational inequality problem (VIP) formats to solve equilibrium problems as well as introduction to existence and uniqueness results, review of relevant game theory notions, presentation of specific models for engineering-economic applications, presentations for algorithms to solve these equilibrium problems.
Credit Only Granted for: ENCE722 or ENME722.

ENME725 Probabilistic Optimization (3 Credits)
Provide an introduction to optimization under uncertainty. Chance-constrained programming, reliability programming, value of information, two stage problems with recourse, decomposition methods, nonlinear and linear programming theory, probability theory. The objectives of this course are to provide understanding for studying problems that involve optimization under uncertainty, learn about various stochastic programming formulations (chance constrained programs, two stage methods with recourse, etc.) relevant to engineering and economic settings, present theory for solutions to such problems, and present algorithms to solve these problems.
Prerequisite: An advanced undergraduate course in probability and a graduate course in optimization or permission of the instructor required. Cross-listed with ENCE725.
Credit Only Granted for: ENME725 or ENCE725.

ENME737 Application of AI in Reliability: Prognostics and Systems Health Management (PHM) (3 Credits)
Prognostics and health management (PHM) is an enabling discipline consisting of technologies and methods to assess the reliability of a product in its actual life cycle conditions to determine the advent of failure and mitigate system risk. PHM permits the reliability of a system to be evaluated and predicted in its actual application conditions. In recent years, prognostics and health management (PHM) has emerged as a key enabling technology to provide an early warning of failure; to forecast maintenance as needed; to reduce maintenance cycles; to assess the potential for life extensions; and to improve future designs and qualification methods. In the future, PHM will enable systems to assess their own real-time performance (self-cognizant health management and diagnostics) under actual usage conditions and adaptively enhance life cycle sustainment with risk-mitigation actions that will virtually eliminate unplanned failures.
Credit Only Granted for: ENME737 or ENME808A.
Formerly: ENME808A.

ENME740 Lab-on-a-Chip Microsystems (3 Credits)
Fundamentals and application of lab-on-a-chip and microfluidic technologies. A broad view of the field of microfluidics, knowledge of relevant fabrication methods and analysis techniques, and an understanding of the coupled multi-domain phenomena that dominate the physics in these systems.
Credit Only Granted for: ENME 481, ENME 808E, ENME 740.
Formerly: ENME 808E.

ENME741 Operations Research Models in Engineering (3 Credits)
A survey of the fundamentals of operations research models and methods in engineering including: optimization using linear programming, nonlinear programming, integer programming, as well as equilibrium/ game theory via mixed complementarity problems. Examples of specialized course items include: specifics of optimizing power and gas networks, discussion of other network optimization problems, resource-constrained problems, two-level optimization as an example of mixed integer nonlinear programming (MINLP) programming problems as well as algorithms to solve the above types of problems."
Prerequisite: (ENCE302; or (ENME271 and ENME392)); and (MATH140 and MATH240). Or permission of instructor.
Credit Only Granted for: ENME738, ENME741, or ENCE603.
Formerly: ENME738.

ENME742 Urban Microclimate and Energy (3 Credits)
Examines urban microclimate from the perspective of transient heat and mass transfer using building energy simulations for building clusters. The focus is on understandingbuilding energy consumption and environmental impacts from the individual building scale (~100) to a neighborhood scale (~103). Emerging morphological properties of building clustersmodulate transient convective and radiative heat transfer resulting in different localmicroclimatic conditions. At the neighborhood scale, these conditions are analyzed using heatand mass transfer simulations in building clusters to provide boundary conditions for transient building energy simulations. At the individual building scale, besides the energy consumption,this course examines connection between indoor and outdoor environments.Jointly offered with ENME424.
Credit Only Granted for: ENME808I, ENME42 4 or ENME742.
Formerly: ENME808I.

ENME743 Applied Machine Learning for Engineering and Design (3 Credits)
Learn how to apply techniques from Artificial Intelligence and Machine Learning to solve engineering problems and design new products or systems. Design and build a personal or research project that demonstrates how computational learning algorithms can solve difficult tasks in areas you are interested in. Master how to interpret and transfer state-of-the-art techniques from computer science to practical engineering situations and make smart implementation decisions.
Prerequisite: Must have completed undergraduate level Statistics (ENME392 or equivalent), or permission of the instructor.
Credit Only Granted for: ENME440, ENME808E OR ENME743.

ENME744 Additive Manufacturing (3 Credits)
Develop a comprehensive understanding of fundamental additive manufacturing-alternatively, "three-dimensional (3D) printing-approaches, including extrusion-based deposition, stereolithography, powder bed-based melting, and inkjet-based deposition. Cultivate a "design-for-additive manufacturing" skill set for combining computer-aided design (CAD) and computer-aided manufacturing (CAM) methodologies to produce successful 3D prints. Fabricate 3D mechanical objects using a variety of 3D printing technologies on campus. Execute a design project that demonstrates how additive manufacturing technologies can overcome critical limitations of traditional manufacturing processes.
Prerequisite: ENME272 and ENME331; or students who have taken courses with comparable content may contact the department. Jointly offered wit h ENME416.
Credit Only Granted for: ENME 416 OR ENME 744.

ENME745 Numerical Methods in Engineering (3 Credits)
Fundamental aspects of how to apply analytical mathematical concepts to discrete data. The course is aimed at graduate students in any area of engineering, and treats the material in a general manner that is not specific to any application or field of specialization.Jointly offered with: ENME417.
Credit Only Granted for: ENME745, ENME808B, ENME417 or ENME489J.
Formerly: ENME808B.

ENME746 Medical Robotics (3 Credits)
The evolution of robotics in surgery is a new and exciting development. Surgical robotics brings together many disparate areas of research such as development and modeling of robotic systems, design, control, safety in medical robotics, haptics (sense of touch), ergonomics in minimally invasive procedures, and last but not the least, surgery. The primary goal of this course is to acquaint the students with the fundamentals of robot design and control and different areas of research that lead to the development of medical robotic systems. As a result, the course will cover basic robot kinematics such as forward and inverse kinematics as well as velocity and acceleration analysis. We will also cover additional topics specific to medical robotics such as medical image guidance. The course will include a project, where students will learn to develop, build, and control a medical robot.
Prerequisite: ENME361.
Credit Only Granted for: ENME808M, ENME489C or ENME746.
Formerly: ENME808M, ENME489C.

ENME750 Applied System Identification (3 Credits)
An introductory graduate level course on system identification, which concerns various methods and techniques for data-driven modeling and estimation of dynamical systems.
Credit Only Granted for: ENME808R or ENME750.
Formerly: ENME 808R.

ENME751 Applied Nonlinear Control (3 Credits)
An introductory graduate level course on nonlinear control design, which concerns various methods and techniques for the analysis and synthesis of nonlinear control systems.
Credit Only Granted for: ENME808B or ENME751.
Formerly: ENME808B.

ENME753 Indoor Environment and Mechanical Systems (3 Credits)
Fundamentals of indoor air quality and its measurements. Exploration of air cleaning technologies for gaseous, particulate and infectious agent contaminants. Simulations of air flow and contaminants with multi-zone models to allow testing of both contaminant dispersion in buildings and effectiveness of air cleaning technologies.Jointly offered with: ENME422.
Credit Only Granted for: ENME422, ENME753, or ENME808U.
Formerly: ENME808U.

ENME765 Thermal Issues in Electronic Systems (3 Credits)
This course addresses a range of thermal issues associated with electronic products life cycle. Computational modeling approaches for various levels of system hierarchy. Advanced thermal management concepts including: single phase and phase change liquid immersion, heat pipes, and thermoelectrics.
Prerequisite: ENME331 and ENME332.
Corequisite: ENME473; or students who have taken courses with comparable content may contact the department.

ENME770 Life Cycle Cost and System Sustainment Analysis (3 Credits)
This course melds elements of traditional engineering economics with manufacturing process and sustainment modeling, and life cycle cost management concepts to form a practical foundation for predicting the cost of products and systems. Various manufacturing cost analysis methods will be presented including: process-flow, parametric, cost of ownership, and activity based costing. The effects of learning curves, data uncertainty, test and rework processes, and defects will be considered. Aspects of system sustainment including the impact on the life cycle (and life cycle costs) of reliability, maintenance, environmental impact, and obsolscence will be treated.
Credit Only Granted for: ENME464 or ENME770.

ENME775 Manufacturing Technologies for Electronic Systems (3 Credits)
This highly multi-disciplinary course presents the mechanical fundamentals of manufacturing processes used in electronics assemblies. The emphasis is on quantitative modeling of the intrinsic impact that processing has on structure, properties, performance and durability. Students will learn how to quantitatively model many of the key manufacturing steps from mechanistic first principles, so that sensitivity studies and process optimization can be performed in a precise manner. Processes considered include: wafer-level processes such as polishing, lithography, etching and dicing; packaging operations such as die attachment, wirebonding, flip chip bonding, and plastic encapsulation; multilevel high-density substrate fabrication processes; assembly processes such as reflow and wave soldering of surface-mount components to electronic substrates.
Prerequisite: ENME690.

ENME780 Mechanical Design of High Temperature and High Power Electronics (3 Credits)
This course will discuss issues related to silicon power device selection (IGBT, MCT, GTO, etc.), the characteristics of silicon device operation at temperatures greater thatn 125C, and the advantages of devices based on SOI and SiC. It will also discuss passive components and packaging materials selection for distributing and controlling power, focusing on the critical limitations to use of many passive components and packaging materials at elevated temperatures. In addition it will cover packaging techniques and analysis to minimize the temperature elevation caused by power dissipation. Finally, models for failure mechanisms in high temperature and high power electronics will be presented together with a discussion of design options to mitigate their occurrence.
Prerequisite: ENME382, ENME473, or ENME690.

ENME788 Seminar (1-3 Credits)
First or second semester. Credit in accordance with work outlined by mechanical engineering staff.

ENME799 Master's Thesis Research (1-6 Credits)

ENME808 Advanced Topics in Mechanical Engineering (2-3 Credits)

ENME898 Pre-Candidacy Research (1-8 Credits)

ENME899 Doctoral Dissertation Research (1-8 Credits)

ENNU - Engineering, Nuclear

ENNU468 Research (2-3 Credits)
Investigation of a research project under the direction of one of the staff members. Comprehensive reports are required.
Restriction: Permission of instructor; and permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits.

ENNU489 Special Topics in Nuclear Engineering (3 Credits)
Selected topics of current importance in nuclear engineering.
Restriction: Permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits if content differs.

ENNU609 Seminar in Nuclear Engineering (1 Credit)

ENNU620 Mathematical Techniques of Reliability Engineering (3 Credits)
Basic probability and statistics. Application of selected mathematical techniques to the analysis and solution of reliability engineering problems. Applications of matrices, vectors, tensors, differential equations, integral transforms, and probability methods to a wide range of reliability related problems.Cross-listed with ENRE620.

ENNU633 Convective Transport Phenomena in Single- and Multi-Phase Systems (3 Credits)
Single medium - single phase systems, two-phase systems; Two media - solid-fluid systems: continuous interface, large interfacial area, fluid-fluid systems; Three media - solid-solid-fluid systems, solid- liquid-gas systems.

ENNU643 Radiation Processing in Advanced Manufacturing (3 Credits)
Radiation processing facilities for industrial production - electron beam, gamma, x-ray; types of electron beam machines; radiation processing - yields, G-values, throughput, efficiency; readiation in advanced manufacturing; radiation sensors and dosimetry; sterilization of industrial products; radiation-physical technology.

ENNU648 Special Problems in Nuclear Engineering (1-16 Credits)

ENNU649 Selected Topics in Nuclear Engineering (1-3 Credits)
Topics of current interest in nuclear engineering.
Prerequisite: Permission of ENGR-Materials Science & Engineering department.
Repeatable to: 6 credits if content differs.

ENNU652 Principles of Reliability Analysis (3 Credits)
Principal methods of reliability analysis, including fault tree and reliability block diagrams; Failure Mode and Effects Analysis (FMEA); event tree construction and evaluation; reliability data collection and analysis; methods of modeling systems for reliability analysis. Focus on problems related to process industries, fossil-fueled power plant availability, and other systems of concern to engineers.Cross-listed with ENRE602.
Credit Only Granted for: ENRE602 or ENNU652.

ENNU653 Mechanical reliability of Materials (3 Credits)
Introduction to engineering materials; atomic structure; diffusion; defects; phase equilibria; kinetics and microstructures; deformations; fracture; materials testing; fatigue and creep; thermal properties; failure mechanisms; fractography; failure modeling.
Prerequisite: ENNU651.

ENNU655 Radiation Engineering (3 Credits)
An analysis of such radiation applications as synthesizing chemicals, preserving foods, control of industrial processes, design of irradiation installations. E.G., Cobalt 60 gamma ray sources, electronuclear machine arrangement, and chemonuclear reactors.
Restriction: Permission of instructor; and permission of ENGR-Materials Science & Engineering department.

ENNU799 Master's Thesis Research (1-6 Credits)

ENNU898 Pre-Candidacy Research (1-8 Credits)

ENNU899 Doctoral Dissertation Research (1-8 Credits)

ENPM - Engineering, Professional Masters

ENPM600 Probability and Stochastic Processes for Engineers (3 Credits)
Axioms of probability; conditional probability and Bayes' rule; random variables, probability distributions and densities; functions of random variables; definition of stochastic process; stationary processes, correlation functions, and power spectral densities; stochastic processes and linear systems; estimation and optimum filtering. Applications in communication and control systems, signal processing, and detection and estimation.
Prerequisite: Undergraduate introduction to discrete and continuous probability.

ENPM601 Analog and Digital Communication Systems (3 Credits)
Analog modulation methods including AM, DSBSC-AM, SSB, and QAM; effects of noise in analog modulation systems. Digital communication methods for the infinite bandwidth additive white Gaussian noise channel: PAM, QAM, PSK, FSK modulation; optimum receivers using the MAP principle; phase- locked loops; error probabilities. Digital communication over bandlimited channels: intersymbol interference and Nyquist's criterion, adaptive equalizers, symbol clock and carrier recovery systems, trellis coding. Spread spectrum systems: direct sequence modulation and frequency hopping.
Prerequisite: ENPM600; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of Maryland Applied Graduate Engineering.

ENPM602 Data Networks (3 Credits)
Principles of network design, circuit switching and packet switching, OSI Reference Model; parity and cyclic redundancy check codes; retransmission request protocols; Markov chains and queuing models for delay analysis; multiaccess communication, local area networks, Ethernet and Token Ring standards; routing, flow control, internetworking; higher layer functions and protocols. Software tools for network simulation and performance analysis will be used.
Prerequisite: ENEE324; or students who have taken courses with comparable content may contact the department.

ENPM603 Theory and Applications of Digital Signal Processing (3 Credits)
Uniform sampling and the sampling theorem; the Z-transform and discrete-time system analysis; multi-rate systems; discrete-time random processes; methods for designing FIR and IIR digital filters; effects of quantization and finite work-length; the DFT and FFT; power spectrum estimation.
Prerequisite: Undergraduate introduction to discrete-time systems.

ENPM607 Computer System Design and Architecture (3 Credits)
Principles of computer design and cost/performance factors; instruction set design and implementation, RISC vs. CISC instruction sets; control unit and pipeline design; floating-point arithmetic; memory hierarchy designs, caches, memory interleaving, virtual memory; I/O device interconnections to CPUs and main memory. Additional topics include parallel system designs, SIMD, MIMD, SPMD; interconnection networks for processors and memories; optimization of pipeline operations; superscalar architectures, power management techniques.
Prerequisite: ENEE446; or students who have taken courses with comparable content may contact the department.

ENPM609 Microprocessor-Based Design (3 Credits)
Introduction to microprocessor components, software, and tools. Architectures, instruction sets, and assembly language programming for a commercial microprocessor family. Real-time programming techniques. Peripheral chips such as, parallel ports, counter-timers, DMA controllers, interrupt controllers, and serial communication units. Design projects emphasizing intergrated hardware and software solutions to engineering problems.
Prerequisite: Must have completed undergraduate courses in logic design, computer architecture, and programming.

ENPM610 Digital VLSI Design (3 Credits)
VLSI design with emphasis on CMOS technology. Logic functions using CMOS switches; MOSFET characteristics; BiCMOS, dynamic logic and domino logic structures; PLA's, FPLA's, and gate arrays; layout via MAGIC, use of VHDL, IRSIM, and Spice; design rules and verification techniques; packaging techniques; chip design options: standard cells, sea-of-gates, full custom; design capture and verification tools; design of CMOS datapaths, memory, and control; possible fabrication via MOSIS.
Prerequisite: Must have completed undergraduate courses in solid state devices and digital/analog circuit design.

ENPM611 Software Engineering (3 Credits)
Software engineering concepts, methods, and practices important to both the theorist and the practitioner will be covered. The entire range of responsibilities expected of a software engineer are presented. The fundamental areas of requirements development, software design, programming languages, and testing are covered extensively. Sessions on supporting areas such as systems engineering, project management, and software estimation are also included.
Prerequisite: Competency in one programming language; and must have completed an undergraduate software engineering course.

ENPM612 System and Software Requirements (3 Credits)
Focus will be placed on the theoretical and practical aspects of requirements development. Students will recognize the place of requirements, how to work with users, requirements methods and techniques, the various requirements types, how to set requirements development schedules, requirements evolution, how to model and prototype requirements, how to evaluate and manage risk in requirements, techniques to test requirements, how to manage the requirements process, and how to write an effective requirements document.
Prerequisite: ENPM611.
Restriction: Permission of Maryland Applied Graduate Engineering.

ENPM613 Software Design & Implementation (3 Credits)
Covers the software design process, from understanding the need or problem, to creating suitable architecture and detailed design solutions, to preserving and evolving the design during implementation and maintenance. The main study topics include: requirements analysis models; user centered design; architecture design through decomposition and composition; architecture styles and architecture tactics for supporting various quality attributes such as security and usability; design for reuse and with reuse; detailed design object-oriented principles (such as SOLID) and design patterns; approaches for evaluating, comparing, and selecting design solutions; standard notations for documenting architecture views, detailed design, and analysis models; and industry standards for creating design deliverables. Students will acquire not only technical knowledge, but also soft skills such as communication, collaborations, critical thinking, leadership, negotiation, and time management.
Prerequisite: ENPM611.
Restriction: Permission of Maryland Applied Graduate Engineering.

ENPM614 Software Testing & Maintenence (3 Credits)
Aspects of software development after coding is completed will be covered. Students will understand the various levels of testing, techniques for creating test data, how to manage test cases and scenarios, testing strategies and methods, testing batch, client/server, real-time, and Internet systems, and the development of an effective test plan. Software maintenance will include the creation of easily maintained software; preventive maintenance, corrective maintenance, and enhancements; configuration management practices; and assuring quality in software manintenance.
Prerequisite: ENPM611.
Restriction: Permission of Maryland Applied Graduate Engineering.

ENPM615 Embedded Systems (3 Credits)
Introduction to embedded systems design and evaluation: requirements, specification, architecture, hardware and software components, integration and performance evaluation. Topics include instruction sets, CPU, embedded computing platform, program design and analysis, operating systems, hardware accelators, multiprocessors, networks, and system analysis. Real-life embedded systems design examples will be used throughput the course to illustrate these concepts.
Prerequisite: Must have completed undergraduate courses in logic design, computer architecture, and programming.

ENPM616 Wireless Communications: Systems and Network Design Principles (3 Credits)
Introduction to foundational concepts, solutions and design principles of wireless communication used by modern wireless technologies and standards. Topics include: key characteristics and modeling of different radio propagation effects including path loss, fading, interference effects in mobile networks, digital wireless communication techniques used to address channel effects, starting source and channel coding to modulation, link adaptation, scheduling and diversity schemes, advance multi-antenna, various multiple access schemes, multicast, unicast, sidelink communications and random access based channel access, system architecture, channelization schemes, downlink/uplink synchronization, system access and mobility management procedure in a basic cellar network, system design issues, RF coverage and capacity analysis using link budget analysis and basic traffic dimensioning and capacity analysis concepts.

ENPM617 Compilers (3 Credits)
Covers the underlying techniques of Compiler Construction. The course will introduce the theory and tools that can be employed in order to perform syntax-directed translation of a high-level programming language into an executable code. Topics covered include: lexical analysis; parsing theory; symbol tables; semantic analysis; intermediate representations; runtime environments; code generation; and basic program analysis and optimization. In the optional final project, Students will construct a compiler function for a simple object-oriented language by using LLVM which is a compiler infrastructure, written in C++, and now maintained by Apple Incorporated.
Credit Only Granted for: ENPM808T, ENEE645, or ENPM617.
Formerly: ENPM808T.

ENPM620 Computer Aided Engineering Analysis (3 Credits)
Computer assisted approach to the solution of engineering problems. Review and extension of undergraduate material in applied mathematics including linear algebra, vector calculus, differential equations, and probability and statistics.
Restriction: Permission of Maryland Applied Graduate Engineering.
Credit Only Granted for: ENPM620 or ENRE620/ENNU620.

ENPM621 Heat Pump and Refrigeration Systems Design Analysis (3 Credits)
Thermal engineering of heat pump and refrigeration systems and thermal systems modeling. Thermodynamics and heat transfer. Cycle analysis, alternative refrigerants, graphical analysis using property charts. Analysis of applications such as space conditioning, food perservation, manufacturing, heat recovery and cogeneration.

ENPM622 Energy Conversion I - Stationary Power (3 Credits)
Thermal engineering of modern power generation systems. Cycle analysis of various modern power generation technologies including gas turbine, combined cycle, waste burning and cogeneration. Energy storage and energy transport.

ENPM623 Engineering Combustion Emissions for Air Pollution Control (3 Credits)
Analysis of the sources and mechanisms of combustion generated air pollution. Air pollution due to internal combustion engines, power generation and industrial emissions. Techniques to minimize and control emission.

ENPM624 Renewable Energy Applications (3 Credits)
Thermodynamics and heat transfer of renewable energy sources for heating, power generation and transportation. Wind energy, solar thermal, photovoltaic, biomass, waste burning, and hydropower. Broad overview of the growing use of renewable energy sources in the world economy with detailed analysis of specific applications.
Prerequisite: Knowledge of thermodynamics, fluid mechanics, and heat transfer; and permission of Maryland Applied Graduate Engineering.
Credit Only Granted for: ENPM624 or ENME701.

ENPM625 Heating, Ventilation and Air Conditioning of Buildings (3 Credits)
Low pressure side of buildings heating and cooling systems. Thermodynamics, heat transfer and digital control principles applied to field problems. Quantitative analyses stressed. Topics include psychometrics, thermal loads, incompressible flow in ducts and pipes, heat exchangers, cooling towers, PID control systems.

ENPM626 Waste and Biomass Energy Conversion (3 Credits)
Thermal, chemical, and biological processes for conversion of wastes (primarily solid and liquid) to reduce environmental impact and increase recovery of useful energy resources. Emphasis on solid wastes and their composition. Identification of pollution products and their control.
Prerequisite: Must have completed undergraduate courses in thermodynamics and heat transfer.
Restriction: Permission of Maryland Applied Graduate Engineering.

ENPM627 Environmental Risk Analysis (3 Credits)
Covers fundamental aspects of environmental risk analysis and methods used to perform environmental risk analyses. Topics covered in the class include: establishing the scope of an analysis, developing alternate conceptual models, representing source term release, modeling contaminant transport in environmental media (e.g., surface water, groundwater, air), modeling food chains, conducting an exposure assessment, understanding basic human toxicology, characterizing the dose-response relationship, and effectively communicating about and managing risk. This course covers fundamental aspects of designing a risk analysis as well as common pitfalls to avoid and major sources of uncertainty in environmental risk analyses.

ENPM631 TCP/IP Networking (3 Credits)
Exploration of how such a variety of devices can use a big range of technologies to connect seamlessly to each other. In the second half of the course we translate the basic knowledge of the protocols to more hands-on exercises in containerization (Docker) and at the end we give an introduction to Kubernetes, that is an open-source system for automating deployment and management of containerized applications.
Prerequisite: ENPM602; or permission of instructor.
Restriction: Permission of Maryland Applied Graduate Engineering.

ENPM632 Advanced TCP/IP Networking (3 Credits)
This course builds on the topics discussed in TCP/IP Networking (ENPM 631) and provides more in depth discussion of networking and application development. Highlights include IPv6, Socket programming, Docker, Kubernetes, Helm charts, Multi-protocol Label Switching (MPLS), and Internet security.
Prerequisite: ENPM631; or permission of instructor.
Restriction: Permission of Maryland Applied Graduate Engineering.

ENPM634 Penetration Testing (3 Credits)
This course will give students a hands-on deep dive into penetration testing tools and methodologies. Starting with reconnaissance, open source intelligence, and vulnerability scanning we will move on to exploiting both clients and servers, moving laterally through a network while evading security measures.
Credit Only Granted for: ENPM809Q or ENPM634.
Formerly: ENPM809Q.

ENPM635 Thermal Systems Design Analysis (3 Credits)
Evaluates the trade-offs associated with thermal systems. Use of software for system simulation, evaluation and optimization. Applications include power and refrigeration systems, pipe flow systems, distillation columns, dehumidifying coils, and co-generation systems.
Prerequisite: Undergraduate courses in thermodynamics, fluid mechanics and heat transfer.
Credit Only Granted for: ENPM635 or ENME635.

ENPM640 Rehabilitation Robotics (3 Credits)
An introduction to a field of robotics dedicated to improving the lives of people with disabilities. The course is designed for students wishing to learn more about rehabilitation robotics, one of the fasting growing fields of robotics. Rehabilitation robotics is the application of robots to overcome disabilities resulting from neurologic injuries and physical trauma, and improve quality of life. This course considers not only engineering design and development, but also the human factors that make some innovative technologies successful and others commercial failures. Engineering innovation by itself, without considering other factors such as evidence-based R&D and product acceptance, may mean that some technologies don't become or remain available or are inefficacious to aid their intended beneficiaries. This course differs from medical robotics in its focus on improving the quality of life through robot-mediated rehabilitation treatments, rather than improving or enhancing applications such as surgical interventions.
Recommended: Basic understanding of linear time-invariant control systems (e.g. ENPM667) is preferred but not required. No background or previous experience in assistive robotics, human biomechanics, and/or neuroscience is required.
Credit Only Granted for: ENPM808J, ENPM640, or ENME444.
Formerly: ENPM808J.

ENPM645 Human-Robot Interaction (3 Credits)
To define the intersection of human-robot interactions to include human-computer interfaces, as well as robotic emotions and facial expressions emulations. The result will provide a basis for students to assess the best approaches for interacting effectively with robots. Areas to be covered include biologically-inspired robotics, cognitive robotics, cultural and social aspects of robotics, data mining, examples of human systems interfaces, and machine learning with respect to A.I. principles and limitations.
Recommended: Some knowledge of A.I. fundamentals and data analytics recommended, but not required.
Credit Only Granted for: ENPM808K or ENPM645.
Formerly: ENPM808K.

ENPM650 Solar Thermal Energy Systems (3 Credits)
Covers a review of related fundamentals, including limitations imposed by thermodynamics, solar spectral characteristics, measurement, and analytical models to predict solar irradiance with respect to time, location and orientation. The course will then examine the characteristics of various components in solar thermal systems with particular emphasis on flat plate and concentrating collectors, fixed and tracking collector systems, heat exchangers and thermal storage to understand how they work and how their performance is influenced by their design. The course will then lead to an examination of systems and system performance, including system design, predicted energy savings and related economics. The course will introduce low temperature applications such as solar hot water, space heating and water distillation, as well as concentrating solar energy for solar thermo-chemical processes to produce hydrogen and solar power generation systems. A project of importance to the development of Solar Thermal Power Systems will be assigned.

ENPM651 Heat Transfer for Modern Application (3 Credits)
The applications selected will vary widely: from cooling of electronics to prevention of fog and stalagmite formation in ice rinks. Multi-mode (i.e. simultaneous conduction, convection, radiation, mass transfer) problems will be emphasized. Lectures on basic principles, followed by assignments in which students formulate solutions and explain results.

ENPM652 Applied Finite Element Methods (3 Credits)
For engineering and science students with little or no previous knowledge of the FEM. Study of FEM, using straightforward mathematics. Students should understand basic concepts and equations of elasticity and thermal heat flow, be familiar with simple matrix algebra. Covers stress analysis and thermal analysis problems. ANSYS finite element code will be used for examples and homework solutions. Basic problem solving procedure will be developed for using finite element computer codes.
Restriction: Must not have completed ENME674; and must not have completed ENAE652.
Credit Only Granted for: ENME674, ENAE652, or ENPM652.

ENPM654 Energy Systems Management (3 Credits)
Covers a wide range of energy management and energy efficiency topics including energy auditing, energy efficient lighting systems and motors, demand limiting and control, control strategies for optimization, direct digital control, integrated building automation systems, communication networks, distributed generation, cogeneration, combined heat and power, process energy management and the associated economic analyses. Included will be the latest internet based technologies for accessing real-time energy pricing and managing energy demand remotely for multiple buildings or campuses.
Recommended: Background in thermodynamics, fluid mechanics, and heat transfer is recommended.

ENPM656 Energy Conversion II -- Mobile Power (3 Credits)
Presents the scientific and engineering basis for design, manufacture, and operation of thermal conversion technologies utilized for mobility power generation. The interface between fuel combustion chemistry and generated power are addressed. The practical aspects of design and operation of various alternatives for power are compared. The impact of choices with regard to power and fuel alternatives as well as air pollution potential are also considered.
Prerequisite: Must have completed undergraduate courses in thermodynamics, heat transfer, and fluid mechanics; or ENPM672.

ENPM657 Applied Cryptography (3 Credits)
The goal of this course is to provide students with a foundational understanding of cryptography as used in the real world. Students will learn about private-key encryption, message authentication codes, key-exchange protocols, public-key encryption, and digital signatures, in addition to learning about underlying primitives such as pseudorandom number generators, block ciphers, and hash functions. The course will also try to convey the "cryptographic mindset," including formal threat modeling and proofs of security. We will emphasize real-world usage of cryptography by covering standards and best practices, discussing attacks on deployed systems, and giving programming assignments meant to reinforce the concepts covered in class.
Recommended: Knowledge of C programming.
Credit Only Granted for: ENPM809A or ENPM657.
Formerly: ENPM809A.

ENPM660 Wind Energy Engineering (3 Credits)
An examination of four central topics in wind energy engineering: the nature of wind energy as a resource for generating electricity; the aerodynamics of wind turbines by which the wind energy is converted into mechanical energy; the mechanics and dynamics of the wind energy system (tower, rotor, hub, drive train, and generator); and the electrical aspects of wind turbines. Additional topics to be included in the course include:Wind turbine design; wind turbine control; wind turbine siting, system design, and integration; Wind energy system economics; and wind energy systems environmental impacts and aspects. The course is intended to pass along substantial subject matter knowledge and skills, it can only be treated as an introduction to this extensive, multidisciplinary topic. However, students are expected to emerge with a substantial knowledge of wind energy systems and the methods used to analyze such systems.

ENPM661 Planning for Autonomous Robots (3 Credits)
Planning is a fundamental capability needed to realize autonomous robots. Planning in the context of autonomous robots is carried out at multiple different levels. At the top level, task planning is performed to identify and sequence the tasks needed to meet mission requirements. At the next level, planning is performed to determine a sequence of motion goals that satisfy individual task goals and constraints. Finally, at the lowest level, trajectory planning is performed to determine actuator actions to realize the motion goals. Different algorithms are used to achieve planning at different levels. This graduate course will introduce planning techniques for realizing autonomous robots. In addition to covering traditional motion planning techniques, this course will emphasize the role of physics in the planning process. This course will also discuss how the planning component is integrated with control component. Mobile robots will be used as examples to illustrate the concepts during this course. However, techniques introduced in the course will be equally applicable to robot manipulators.
Credit Only Granted for: ENPM661 or ENPM808C.
Formerly: ENPM808C.

ENPM662 Introduction to Robot Modeling (3 Credits)
This course introduces basic principles for modeling a robot. Most of the course is focused on modeling manipulators based on serial mechanisms. The course begins with a description of the homogenous transformation and rigid motions. It then introduces concepts related to kinematics, inverse kinematics, and Jacobians. This course then introduces Eulerian and Lagrangian Dynamics. Finally, the course concludes by introducing basic principles for modeling manipulators based on parallel mechanisms. The concepts introduced in this course are subsequently utilized in control and planning courses.
Credit Only Granted for: ENPM662 or ENPM808M.
Formerly: ENPM808M.

ENPM663 Building a Manufacturing Robotic Software System (3 Credits)
This hands-on course will look at the components of manufacturing robots, including architectures, planning/control, simulation, and measurement science. Students will explore the work that is being researched around the world in each of these areas, and will perform small hands-on exercises in most of the classes to gain a deeper understanding of how a selected set of these technologies can be applied to real-world challenges. This course will have invited presentations from experts in the field. The course will culminate in the development of a simulation-based control system that will address challenges presented in the Agile Robotics for Industrial Automation Competition (ARIAC)
Recommended: Prior C++ programming experience.
Credit Only Granted for: ENPM809B or ENPM663.
Formerly: ENPM809B.

ENPM664 Embedded System Hacking and Security (3 Credits)
The purpose of this course is to reveal the tools, techniques and procedures (TTPs) employed by adversaries to exploit and subvert the security of embedded systems. This course will cover the core concepts and techniques to analyze and characterize the behavior of embedded systems and platforms. Concepts will be introduced and discussed within the context of an adversary intent on altering or subverting the behavior of such systems. The course does not expect students to have any prior embedded systems experience.
Credit Only Granted for: ENPM809I or ENPM664.
Formerly: ENPM809I.

ENPM665 Cloud Security (3 Credits)
Covers the fundamentals of securing cloud-based workloads from the ground up with many hands-on examples. Through these hands-on exercises the course will demonstrate where the similarities and differences are when securing the cloud compared to securing traditional IT.
Credit Only Granted for: ENPM809J or ENPM665.
Formerly: ENPM809J.

ENPM667 Control of Robotic Systems (3 Credits)
This is a basic course on the design of controllers for robotic systems. The course starts with mainstay principles of linear control, including a review of elementary concepts of systems, and discusses applications to independent joint control. The second part of the course introduces a physics-based approach to control design that uses energy and optimization principles to tackle the design of controllers that exploit the underlying dynamics of robotic systems. The course ends with an introduction to force control and basic principles of geometric control if time allows.
Credit Only Granted for: ENPM667 or ENPM808Q.
Formerly: ENPM808Q.

ENPM670 Advanced Energy Audit, Modeling, and Management of Building Systems (3 Credits)
Provides students with fundamentals and applications of energy audit, modeling, and management in building energy systems. Energy audit procedures for electrical, lighting, mechanical and HVAC systems will be covered, and will include the economics/life-cycle costing analysis. Students will gain experience on conducting energy audit through real-world project(s). Building energy modeling tools, such as EnergyPlus and eQuest, will be introduced and implemented through assigned projects. The course coverage will also include contemporary topics such as energy management of mission critical facilities such as data centers, integrated building automation and control systems for energy efficiency, and real-time energy management for individual and network of buildings.
Prerequisite: Prior knowledge of undergraduate basic thermodynamics and heat transfer.
Recommended: Knowledge of electrical systems and controls is desirable.

ENPM671 Advanced Mechanics of Materials (3 Credits)
Formulate and quantitatively state the mechanical/physical responses of structural components and configurations subjected to loads, temperature, pre-strains etc. The two methods of anlysis employed are the mechanics of materials approach and the theory of elasticity approach. Analysis and design of components of structural/machine systems as experienced in aeronautical, civil, mechanical and nuclear engineering.

ENPM672 Fundamentals for Thermal Systems (3 Credits)
Included in this course is an introduction to thermodynamics, fluid mechanics and heat transfer. Emphasis is on gaining an understanding of the physical concepts through the solving of numerical problems associated with simple thermal fluid processes and cycles. Both ideal gases and multiphase fluids will be considered as the working fluids.
Prerequisite: Undergraduate engineering, physics or chemistry degree.
Restriction: Permission of Maryland Applied Graduate Engineering.

ENPM673 Perception for Autonomous Robots (3 Credits)
Image Processing and Computer Vision techniques for Mobile Robots is taught. Three topics are covered: Image Processing (Image Enhancement, Filtering, Advanced Edge and Texture), 3D Vision (3D Geometry from Multiple view geometry, Motion Processing and Stereo) and an Introduction to Image Segmentation and Object Recognition. Students are introduced to a number of existing software toolboxes from Vision and Robotics, and will implement a number of smaller projects in Python.
Prerequisite: Proficiency in a programming language is required.
Recommended: Familiarity with Python.

ENPM674 Design and Synthesis of Digital Systems (3 Credits)
Students will be introduced to HDL-based design of modern digital systems, and will cover in depth the design and implementation of digital systems using the Verilog HDL. Students will learn fundamental concepts of the Verilog language; modeling of complex digital systems; simulation and verification; and Verilog coding styles for synthesis. Hands-on experience will be developed through practical designs, exercises, and projects. Students will use state-of-the-art EDA tools to design, simulate, and test digital systems. The latter part of the course will focus on customized programmable platforms such as graphics processors (GPUs) multicore platforms and FPGAs as well as coding, building, and debugging for such platforms.
Prerequisite: ENEE140, ENEE150, and ENEE350; or students who have taken courses with comparable content may contact the department.
Recommended: ENEE446.

ENPM675 Operating System Design (3 Credits)
An overview that covers process management (processes and threads, process scheduling, and process synchronization and communication), memory management (main and virtual), storage management (file and I/O), and protection and security.
Prerequisite: Undergraduate coursework in computer organization and assembly language programming.

ENPM676 VLSI Testing and Design for Testability (3 Credits)
An overview of VLSI test process and equipment, faults, fault modeling, fault simulation, combinational logi ATPG, sequential logic ATPG, Iddq testing, function testing, memory testing, delay testing, design for testability, BIST (Built-In Self-Test) and boundary scan.
Prerequisite: ENEE244; or students who have taken courses with comparable content may contact the department.

ENPM677 Wireless Sensor Networks (3 Credits)
Focuses on networking aspects, protocols and architectures for Wireless Sensor Networks. Provides a thorough description of the most important issues and questions that have to be addressed in a wireless sensor neto work.

ENPM685 Security Tools for Information Security (3 Credits)
Students will perform host- and network-based security tasks relating to security, investigation, compliance verification and auditing using a wide selection of commonly used tools on both Windows and Linux platforms, with emphasis on open source tools.
Prerequisite: Familiarity with Linux and Windows operating systems, as well as TCP/IP and basic networking concepts.
Credit Only Granted for: ENPM808D or ENPM685.
Formerly: ENPM808D.

ENPM686 Information Assurance (3 Credits)
The first half of lectures provides an overview of cybersecurity. One third of these lectures focuses on the fundamentals of cybersecurity like authentication, access control, and security models. The second third focuses on the practice of cybersecurity using Unix and Windows NT as case studies. The last third is dedicated to security in distributed systems including network security, and World Wide Web security.
The second half of the lectures focuses on the information assurance process. First, information assets are enumerated and classified. Second, the main vulnerabilities and threats are identified. Third, a risk assessment is conducted by considering the probability and impact of the undesired events. Finally, a risk management plan is developed that includes countermeasures involving mitigating, eliminating, accepting, or transferring the risks, and considers prevention, detection, and response.
Credit Only Granted for: ENPM808E or ENPM686.
Formerly: ENPM808E.

ENPM687 Digital Forensics and Incidence Responses (3 Credits)
Students will implement a robust incident response methodology, including proper forensic handling of evidence, and cover legal aspects of national and international law regarding forensics. The bulk of the course covers evidence acquisition, preservation, analysis and reporting on multiple platforms.
Prerequisite: Experience with both Windows and Unix-based operating systems, including using the command line.
Credit Only Granted for: ENPM808P or ENPM687.
Formerly: ENPM808P.

ENPM691 Hacking of C programs and Unix Binaries (3 Credits)
Teaches the fundamentals of secure programming in C. An in depth discussion on various security vulnerabilities (e.g., buffer overflows) in C applications will be taught with hands-on demo of concepts during the class. Students will learn how a C program runs "under-the-hood". The course will teach nitty-gritty of C programs by analyzing at the assembly level. The course discusses best practices (e.g., coding standards) and design principles for secure programming so that security can be built-in during design time. In addition to assignments, students are required to present papers related to this course.
Prerequisite: ENEE150; or students who have taken courses with comparable content may contact the department.

ENPM693 Network Security (3 Credits)
Introduction to various approaches to design; specify and verify security protocols used in large systems and networks; familiarization with some current technologies. Security threats and countermeasures, communication security and basic encryption techniques, authentication protocols, data confidentiality and integrity, analysis of cryptographic protocols, and access control in large systems and networks.
Prerequisite: An operating systems and/or network protocol course or equivalent.
Formerly: ENPM808N.

ENPM694 Networks and Protocols (3 Credits)
Provides an in-depth review of the Internet with a focus on the end-to-end effects of technologies and protocols that operate in different layers. All protocols and technologies are covered in a holistic framework with an emphasis on their effect on the network and application performance. The course also includes a brief introduction of more modern concepts in the field of networking such as SDN and NFV to encourage deeper study of those topics.

ENPM695 Secure Operating Systems (3 Credits)
Operating systems are the basic building block on which programmers build applications and on which security-minded professionals rely, whether they are monitoring activity on a computer, testing applications for security, or determining how malicious code affected their network. This course covers advanced topics in operating systems including process management and communication, remote procedure calls, memory management (including shared memory and virtual memory), checkpointing and recovery, file system, I/O subsystem and device management, distributed file systems and security. The course consists of reading and discussing research papers and includes a course project.
Prerequisite: ENPM691 and CMSC106; or permission of instructor. And permission of ENGR-CDL-Office of Advanced Engineering Education.
Credit Only Granted for: ENPM695 or ENPM808B.
Formerly: ENPM808B.
Additional Information: This course assumes knowledge of C programming and a previous operating systems class or knowledge in various issues such as process management, process synchronization, the critical section problem, CPU scheduling, memory management, secondary storage management.

ENPM696 Reverse Software Engineering (3 Credits)
An in-depth understanding of software reverse engineering concepts and hands-on training with reverse engineering tools, including disassemblers, decompilers, and code analyzers. Students will become familiar with both low-level software and the x86 instruction set through binary reversing sessions. This course also provides insights into many subjects such as system security, source code analysis, software design, and program understanding that will be beneficial in a variety of fields.
Prerequisite: ENPM691 and CMSC106; or permission of instructor. And permission of ENGR-CDL-Office of Advanced Engineering Education.
Credit Only Granted for: ENPM808F or ENPM696.
Formerly: ENPM808F.

ENPM697 Secure Software Testing and Construction (3 Credits)
As software gets more complex, there is even more potential for vulnerabilities to remain in the production version. While traditional and emerging software testing methods are very good at detecting a large majority of "bugs" in the software, modifications to the methods are necessary to ensure vulnerabilities related to security are discovered and mitigated prior to release. In industry, there is also a cost-benefit analysis that determines the limits to pre-release testing, further enforcing the need to uniquely identify security vulnerabilities, potentially prioritizing their correction over other vulnerabilities. This course will cover methods of building security in from the beginning of development and testing the resulting software to ensure security vulnerabilities are detected. The course will use a mixture of textbook principles and research papers to cover the concepts. Students will also complete a course project.
Prerequisite: Permission of instructor; or (ENPM691 and CMSC106). And permission of ENGR-CDL-Office of Advanced Engineering Education.
Credit Only Granted for: ENPM808K or ENPM697.
Formerly: ENPM808K.

ENPM808 Advanced Topics in Engineering (1-3 Credits)
Advanced topics selected by the faculty for students in the professional master of engineering program. May be taken for repeated credit when identified by topic title.

ENPM809 Special Topics in Engineering (3 Credits)
Special topics selected by the faculty for students in the professional master of engineering and graduate certificate in engineering program. May be taken for repeated credit when identified by topic title.
Repeatable to: 30 credits if content differs.

ENPP - Engineering and Public Policy
ENRE - Reliability Engineering

ENRE447 Fundamentals of Reliability Engineering (3 Credits)
This course provides a general survey of the techniques of reliability engineering with a focus on quantitative methods. Topics covered include: failure modes and effects analysis, mathematical definition of reliability, probabilistic models to represent failure phenomena, statistical life models for non-repairable components, reliability data analysis, and system reliability models including fault trees, event trees. Students will learn how to apply these techniques to problems related to engineering systems, with example cases for process plants, energy systems and infrastructure.
Prerequisite: MATH141.

ENRE489 Special Topics in Reliability Engineering (3 Credits)
Selected topics of current importance in reliability engineering.
Prerequisite: Permission of ENGR-Mechanical Engineering department.
Repeatable to: 6 credits if content differs.

ENRE600 Fundamentals of Failure Mechanisms (3 Credits)
Advanced failure mechanisms in reliability engineering wiil be taught from a basic materials and defects point of view. The methods of predicting the physics of failure of devices, materials, components and systems are reviewed. The main emphasis will be given to basic degradation mechanisms through understanding the physics, chemistry, and mechanics of such mechanisms. Mechanical failures are introduced through understanding fatigue, creep and yielding in materials, devices and components. The principles of cumulative damage and mechanical yielding theory are taught. The concepts of reliability growth, accelerated life testing, environmental testing are introduced. Physical, chemical and thermal related failures are introduced through a basic understanding of degradation mechanisms such as diffusion, electromigration, defects and defect migration. The failure mechanisms in basic material types will be taught. Failure mechanisms observed in real electronic devices and electronic packaging will also be presented. Problems related to manufacturing, and microelectronics will be analyzed. Mechanical failures are emphasized from the point of view of complex fatigue theory.
Restriction: Permission of ENGR-Mechanical Engineering. Cross-listed with: ENMA626.
Credit Only Granted for: ENMA626, ENMA698M, ENMA698R, or ENRE600.

ENRE601 Fundamentals of Failure Mechanisms (3 Credits)
Introduces students to basic principles of Reliability Engineering and Reliability Physics. The approach is to provide a general tool set by which engineers can understand how to consider reliability in all phases of the design and manufacture of a product. The emphasis is on integrating statistics and probability with understanding the fundamental physics of processes that lead to failures.

ENRE602 Principles of Reliability Analysis (3 Credits)
Principal methods of reliability analysis, including fault tree and reliability block diagrams; Failure Mode and Effects Analysis (FMEA); event tree construction and evaluation; reliability data collection and analysis; methods of modeling systems for reliability analysis. Focus on problems related to process industries, fossil-fueled power plant availability, and other systems of concern to engineers.Cross-listed with ENNU652.
Credit Only Granted for: ENRE602 or ENNU652.

ENRE620 Mathematical Techniques of Reliability Engineering (3 Credits)
Basic probability and statistics. Application of selected mathematical techniques to the analysis and solution of reliability engineering problems. Applications of matrices, vectors, tensors, differential equations, integral transforms, and probability methods to a wide range of reliability related problems.Cross-listed with ENNU620.

ENRE640 Collection and Analysis of Reliability Data (3 Credits)
Reliability data collection and analysis is of high (practical) importance in many essential engineering tasks including but not limited to: design alternatives evaluation, failure root cause analysis, early detection of field reliability problems, warranty reserve allocation, and others. The course teaches nonparametric and parametric statistical procedures of reliability data analysis for both non-repairable and repairable systems. It covers test data analysis (including accelerated and degradation testing), field data analysis (including warranty data and connected fleets data). Machine learning methods in reliability data analysis are discussed as well, along with special topics on condition-based maintenance and prognostics.
Prerequisite: ENRE602.

ENRE641 Probabilistic Physics of Failure and Accelerated Testing (3 Credits)
Models for life testing at constant stress. Graphical and analytical methods. Test plans for accelerated testing. Competing failure modes and size effects. Models and data analyses for step and time varying stresses. Optimizing of test plans.
Credit Only Granted for: ENRE641 or ENRE650.
Formerly: ENRE650.

ENRE642 Reliability Engineering Management (3 Credits)
Unifying systems perspective of reliability engineering management. Design, development and management of organizations and reliability programs including: management of systems evaluation and test protocols, development of risk management-mitigation processes, and management of functional tasks performed by reliability engineers.

ENRE645 Human Reliability Analysis (3 Credits)
Methods of solving practical human reliability problems, cognitive and behavioral modeling, task analysis, performance shaping factors, error classification, distribution of human performance and uncertainty bounds, sources of human error probability data, human error risk mitigation, examples and case studies.
Credit Only Granted for: ENRE645 or ENRE734.
Formerly: ENRE734.

ENRE648 Special Problems in Reliability Engineering (1-6 Credits)
For students who have definite plans for individual study of approved problems. Credit given according to extent of work.
Repeatable to: 6 credits if content differs.

ENRE655 Advanced Methods in Reliability Modeling (3 Credits)
Bayesian methods and applications, estimation of rare event frequencies, uncertainty analysis and propagation methods, reliability analysis of dynamic systems, analysis of dependent failures, reliability of repairable systems, human reliability analysis methods and theory of logic diagrams and application to systems reliability.
Prerequisite: ENRE602.
Credit Only Granted for: ENRE655 or ENRE665.
Formerly: ENRE665.

ENRE657 Telecommunications Systems Reliability (3 Credits)
Reliability perspectives in telecommunications networks, comparison of networks with respect to operations and reliability, network relibility modeling techniques, applicable procedural/human reliability models, and network metric objectives and data collection.
Prerequisite: ENRE602.

ENRE664 Electronic Packaging Materials (3 Credits)
Energy bands and carrier concentration, carrier transport phenomena, p-n junction, bipolar devices, unipolar devices, crystal growth and epitaxy, oxidation and film deposition, diffusion and ion implantation, lithography and etching, integrated devices, electomigration.
Prerequisite: Permission of ENGR-Mechanical Engineering department.
Credit Only Granted for: ENRE648N or ENRE664.
Formerly: ENRE648N.

ENRE670 Probabilistic Risk Assessment (3 Credits)
Why study risk, sources of risk, overview of Risk Assessment and Risk Management, relation to System Safety and Reliability Engineering; measures, representation, communication, and perception of risk; overview of use of risk assessment results in decision making; overview of Probabilistic Risk Assessment (PRA) process; detailed converge of PRA methods including (1) methods for risk scenario development such as identification of initiators, event sequence diagrams, event trees, causal modeling (fault trees, influence diagrams, and hybrid methods), and simulation approaches; (2) methods of risk scenario likelihood assessment, including quantitative and qualitative approaches, as well as uncertainty modeling and analysis. Also covers methods for risk modeling of system hardware behavior, physical phenomena, human behavior, software behavior, organizational environment, and external physical environment. Additional core topics include risk model integration and quantification (Boolean-based, binary decsion diagram, Bayesian belief networks, and hybrid methods), simulation-based Dynamic PRA methods (discrete and continuous) and several examples of large scale PRAs for space missions, nuclear power, aviation and medical systems.
Prerequisite: ENRE602.

ENRE671 Risk Assessment in Engineering (3 Credits)
Introduction to risk management and decision-making, including uncertainty propagation, importance ranking, risk acceptance criteria, decision analysis and other decsion-making techniques, risk communication.
Prerequisite: ENRE670.
Credit Only Granted for: ENRE648W or ENRE671.
Formerly: ENRE648W.

ENRE682 Software Reliability and Integrity (3 Credits)
Defining software reliability, initiatives and standards on software reliability, inherent characteristics of software which determine reliability, types of software errors, structured design, overview of software reliability models, software fault tree analysis, software redundancy, automating tools for software reliability protypes and real time software reliability.
Credit Only Granted for: ENRE682 or ENRE732.
Formerly: ENRE732.

ENRE684 Information Security (3 Credits)
This course is divided into three major components: overview, detailed concepts and implementation techniques. The topics to be covered are: general security concerns and concepts from both a technical and management point of view, principles of security, architectures, access control and multi-level security, trojan horses, covert channels, trap doors, hardware security mechanism, security models, security kernels, formal specifications and verification, networks and distribution systems and risk analysis.Jointly offered with ENME442.
Credit Only Granted for: ENME442, ENRE648 J, or ENRE684.
Formerly: ENRE648J.

ENRE689 Special Topics in Engineering Materials (3 Credits)

ENRE695 Design for Reliability (3 Credits)
Reliability is the ability of a product or system to perform as intended (i.e., without failure and within specified performance limits) for a specified time, in its life-cycle conditions. Knowledge of reliability concepts and principles, as well as risk assessment, mitigation and management strategies prepares engineers to contribute effectively to product development and life cycle management. This course teaches the fundamental knowledge and skills in reliability as it pertains to the design, manufacture, and use of electrical, mechanical, and electro-mechanical products. Topics cover the suitability of the supply chain members to contribute towards development, manufacturing, distribution and support of reliable products; efficient and cost-effective design and manufacture of reliable products; process capability and process control; derating, uprating, FMMEA, reliability prediction and reliability allocation; how to plan and implement product testing to assess reliability; how to analyze degradation, failure, and return data to estimate fundamental reliability parameters; root cause analysis; and reliability issues associated with warranties, regulatory requirements, and liabilities.Cross-listed with: ENME695.
Credit Only Granted for: ENME695 or ENRE695.

ENRE730 Bayesian Reliability Analysis (3 Credits)
Foundations of Bayesian statistical inference, Bayesian inference in reliability, performing a Bayesian reliability analysis, Bayesian decision and estimation theory, prior distributions such as non-informative, conjugate, beta, gamma, and negative log gamma, estimation methods based on attribute life test data for estimating failure rates and survival probabilities. System reliability assessment and methods of assigning prior distribution. Empirical Bayes reliability estimates (implicity or explicitly estimated priors).

ENRE770 Life Cycle Cost and System Sustainment Analysis (3 Credits)
This course melds elements of traditional engineering economics with manufacturing process and sustainment modeling, and life cycle cost management concepts to form a practical foundation for predicting the cost of products and systems. Various manufacturing cost analysis will be presented including: process-flow, parametric, cost of ownership, and activity based costing. The effects of learning curves, data uncertainty, test and rework processes, and defects will be considered. Aspects of system sustainment including the impact on the life cycle (and life cycle costs) of reliability, maintenance, environment impact, and obsolescence will be treated.
Credit Only Granted for: ENME770 or ENRE770.

ENRE798 Master's Non-Thesis Research (1-6 Credits)

ENRE799 Master's Thesis Research (1-6 Credits)

ENRE898 Pre-Candidacy Research (1-8 Credits)

ENRE899 Doctoral Dissertation Research (1-8 Credits)

ENSE - Systems Engineering

ENSE621 Systems Engineering Concepts and Processes: A Model-Based Approach (3 Credits)
An INCOSE-oriented introduction to model-based systems engineering. Provides an overview of systems engineering concepts, processes and methods, with a particular focus on: the development of stakeholder and system requirements; characteristics of well-written requirements; the use of SysML software tools to develop of system- and element-level architectures; and the relationship between requirements and architecture. Architecture-related topics include specification and visualization of system attributes, behavior, and interfaces. Other topics include acquisition and development life cycle models; operational concepts and use cases; requirements and design traceability; analysis, modeling and simulation; systems engineering management; risk management; configuration management; systems-of-systems; and system complexity. The course includes a class project in which teams of 3-5 students use SysML to develop stakeholder requirements, system requirements, and a logical system architecture for an engineered system of interest to them and then perform a design trade-off analysis for some aspect of the system.
Restriction: Permission of ENGR-Institute for Systems Research.
Credit Only Granted for: ENPM641 or ENSE621.

ENSE622 System Trade-off Analysis, Modeling, and Simulation (3 Credits)
This course continues the model-based approach to systems engineering by introducing students to a variety of mathematical modeling and simulation techniques used to perform system performance, optimization, and trade-off analyses. Topics include: linear and integer programming; state machine models of finite state machines; development of simple intelligent agents; modeling Markov processes; queueing theory; multi-objective trade-off analyses; decision trees; stochastic (Monte Carlo) simulation, linear regression, some predictive analytic techniques; and an introduction to control theory. Mathematical models and simulations are developed and executed using MATLAB. The course includes a class project in which students solve a problem of interest to them using one or more of techniques addressed in class.
Prerequisite: Permission of ENGR-Institute for Systems Research; and ENSE621.
Recommended: Familiarity with calculus, probability, linear algebra, differential equations, & computer programming recommended.
Credit Only Granted for: ENPM642 or ENSE622.

ENSE623 System Development, Verification, and Validation (3 Credits)
This course completes the ENSE621, ENSE622 sequence. It covers system simulation development and a variety of verification and validation topics. It addresses development testing and operational testing; test methodologies; the planning of test programs and Test and Evaluation Master Plans (TEMPs); the planning and execution of tests; and the writing of test plans and test reports. Topics include verification methods; specification-based testing; test verification matrices; model-based verification; model checking and other formal approaches to verification; design of experiments; performance testing; reliability testing; usability/human factors testing; and other types of testing. The course includes a class project in which teams of 3-5 students: develop requirements for a simulation that supports a system analysis of interest (the user need); develop the simulation (in MATLAB); verify that it meets its requirements; and validate that it may be used to support the analysis of interest.
Prerequisite: Permission of ENGR-Institute for Systems Research; and ENSE622.
Credit Only Granted for: ENPM643 or ENSE623.

ENSE624 Human Factors in Systems Engineering (3 Credits)
This course covers the general principles of human factors, or ergonomics as it is sometimes called. Human Factors (HF) is an interdisciplinary approach for dealing with issues related to people in systems. It focuses on consideration of the characteristics of human beings in the design of systems and devices of all kinds. It is concerned with the assignment of appropriate functions for humans and machines, whether the people serve as operators, maintainers, or users of the system or device. The goal of HF is to achieve compatibility in the design of interactive systems of people, machines, and environments to ensure their effectiveness, safety and ease of use.
Restriction: Permission of ENGR-Institute for Systems Research.
Credit Only Granted for: ENPM644 or ENSE624.

ENSE626 System Life Cycle Analysis and Risk Management (3 Credits)
This course covers topics related to estimating the costs and risks incurred through the lifetimes of projects, products and systems. In addition, treatment is given to methods that determine the drivers of costs and risks and facilitate determination of the most effective alternatives to reducing them. Also covered, are relevant analytic tools from probability and statistics and also important managerial and organizational concepts. Extensive use is made of case studies and examples from industry and government.
Prerequisite: Permission of ENGR-Institute for Systems Research.

ENSE627 Systems Quality and Robustness Analysis (3 Credits)
This course covers systems engineering approaches for creating optimal and robust engineering systems and for quality assurance. It provides an overview of the important tools for quality analysis and quality management of engineering systems. These tools are commonly used in companies and organizations. Focus is placed on the Baldrige National Quality Program, ISO 9000 certification, six-sigma systems, and Deming total quality management to examine how high quality standards are sustained and customer requirements and satisfactions are ensured. The Taguchi method for robust analysis and design is covered and applied to case studies. Issues of flexible design over the system life cycle are addressed. Statistical process control, international standards for sampling, and design experimentation are also studied.
Restriction: Permission of ENGR-Institute for Systems Research.
Credit Only Granted for: ENPM647 or ENSE627.

ENSE698 Special Topics in Systems Engineering (3 Credits)
Prerequisite: ENSE621; and permission of ENGR-Institute for Systems Research.
Repeatable to: 6 credits if content differs.

ENSE699 Directed Study in Systems Engineering (1-3 Credits)
Directed study in Systems Engineering.
Prerequisite: ENSE621, ENSE622, and ENSE623.
Repeatable to: 3 credits if content differs.

ENSE799 Systems Engineering Thesis (1-6 Credits)
The application of systems engineering concepts, principles, and theories will be applied to the Master's Thesis project. Project/thesis work will be defined and selected early in student's program and supervised by a university faculty mentor.
Prerequisite: Permission of ENGR-Institute for Systems Research; and ENSE621; and must have 6 additional credits totaling 9 credit hours.
Repeatable to: 6 credits.

ENSP - Environmental Science and Policy

ENSP400 Capstone in Environmental Science and Policy (3 Credits)
Integration of physical, biological, and social sciences with applications to environmental science and policy. Problem-solving and multi-disciplinary case study evaluations pertinent to contemporary and future issues related to the environment.
Prerequisite: ENSP101; and ENSP102.
Restriction: Must be in Environmental Science and Policy program; and senior standing; and permission of the Environmental Science and Policy Program.

ENSP489 Special Topics in Environmental Science and Policy (1-3 Credits)
A lecture and or laboratory series organized to study a selected phase of Environmental Science and Policy not covered by existing courses. Credit according to time scheduled and organization of the course.
Repeatable to: 6 credits if content differs.

ENSP499 Honors Thesis Research (1-6 Credits)
Individual research, thesis, and oral defense. The research project will be conducted under the supervision of a faculty member.
Restriction: Must be in the ENSP Honors program; and permission of AGNR-Dean-Environmental Science & Policy Program.
Repeatable to: 6 credits.

ENSP699 Special Topics in Environmental Science and Policy (1-6 Credits)
Independent study course.
Prerequisite: Permission of AGNR-Dean-Environmental Science & Policy Program.
Restriction: Permission of instructor; and permission of AGNR-Dean-Environmental Science & Policy Program.
Repeatable to: 6 credits.

ENST - Environmental Science and Technology

ENST403 Invasive Species Ecology (3 Credits)
We will examine ecological, evolutionary, and anthropogenic processes facilitating or resisting biological invasions, and consider their environmental, economic, and human health impacts. We will consider various management strategies to mitigate invasions and identify areas of future research. Field trips and detailed discussion of recent findings and controversies in the literature will help illustrate fundamental concepts of invasions among various ecosystems.
Credit Only Granted for: ENST403, ENST603, or ENST689R.

ENST404 Ecological and Natural Resources Ethics (3 Credits)
Bridges science and management with ethical theory and concepts to help scientists, regulators, and managers understand how to deal with potential ethical dilemmas that arise in natural resource and environmental management implementation and policy development.
Prerequisite: ENST214 and ENST360.
Recommended: ENST314, ENST410, and ENST460.
Restriction: Senior standing or higher. Jointly offered with ENST604.
Credit Only Granted for: ENST604 or ENST404.

ENST405 Energy and Environment (3 Credits)
Introduction to the role of energy in environmental and human-dominated systems. Discussion of the historical and modern production and consumption of energy. Introduction to energy systems computer simulation and energy auditing.
Prerequisite: MATH140 or MATH120; or must have completed MATH220.
Restriction: Junior standing or higher. And must be in Environmental Sci & Tech program; or must be in Environmental Sci & Tech: Ecological Tech Design program; or must be in Environmental Sci & Tech: Environmental Health program; or must be in Environmental Sci & Tech: Soil & Watershed Science program; or must be in Environmental Sci & Tech: Natural Resources Mgmt program. Jointly offered with ENST605.
Credit Only Granted for: ENST405, ENSP350, ENST605, or MEES698Z.

ENST406 Applied Forestry Practices (3 Credits)
Focuses on the applied dynamics of a set of forest practices such as management, silviculture, measurement and inventory, preparation of a management plan, etc, within the urban/rural interface. Several field trips are included to gain hands-on experience.
Prerequisite: ENST200. And ENST360; or PLSC471. Cross-listed with PLSC4 75.
Credit Only Granted for: ENST406 or PLSC475.

ENST410 Ecosystem Services: An Integrated Analysis (3 Credits)
The importance of our ecosystems and the services they provide will be discussed. Basic principles used to analyze ecosystem services will be discussed and applied using case studies & field exercises. Forestland, wetlands and our marine resources are increasingly recognized for their ecosystem services provided to society, to include clean air and water, wildlife habitat, biodiversity, carbon storage and pollination services. This course will prepare students to deal with the complex issues involved in understanding those and other ecosystem services and their importance to society and environmental sustainability. Slowly, new markets are emerging for these services. Students will analyze the ecological, policy and financial dimensions of enhancing, restoring, and sustaining ecosystem services. New and on-going government programs and private business ventures will be discussed.
Prerequisite: ENST360 or BSCI361; or permission of instructor.
Restriction: Must be in one of the following programs (Environmental Sci & Tech: Ecological Tech Design; Environmental Sci & Tech; Environmental Sci & Tech: Natural Resources Mgmt; Environmental Sci & Tech: Soil & Watershed Science; Environmental Sci & Tech: Environmental Health).

ENST411 Principles of Soil Fertility (3 Credits)
Soil factors affecting plant growth and quality with emphasis on the bio-availability of mineral nutrients. The management of soil systems to enhance plant growth by means of crop rotations, microbial activities, and use of organic and inorganic amendments.
Prerequisite: ENST200; or students who have taken courses with comparable content may contact the department. Jointly offered with ENS T611.
Credit Only Granted for: ENST411 or NRSC411.
Formerly: NRS C411.

ENST414 Soil Morphology, Genesis and Classification (4 Credits)
Processes and factors of soil genesis. Taxonomy of soils of the world by U.S. System. Soil morphological characteristics, composition, classification, survey and field trips to examine and describe soils.
Prerequisite: ENST200.
Credit Only Granted for: ENST414 or NRSC414.
Formerly: NRSC414.

ENST415 Renewable Energy (3 Credits)
An overview of renewable energy technologies and their current applications. Emphasis will be placed on technological readiness, efficiency and sustainability of renewable energy alternatives. Technologies include solar thermal, photovoltaics, biodiesel, ethanol, anaerobic digestion, wind, hydroelectric, and microbial fuel cells.
Prerequisite: CHEM131, PHYS121, and MATH113; or permission of AGNR-Environmental Science & Technology department.
Restriction: Must be in a major within AGNR-Environmental Science & Technology department.

ENST417 Soil Physics and Hydrology (3 Credits)
A study of soil water interactions: the hydrologic cycle; the unique properties of water and soil; the soil components and their interactions; the field water cycle; transport processes involving water, heat and solutes; human effects on soil and groundwater; as well as the measurement, prediction, and control of the physical processes taking place in and through the soil.
Prerequisite: ENST200; and (MATH113 or MATH115). Or permission of instructor.
Credit Only Granted for: ENST417 or NRSC417.
Formerly: NRSC417.

ENST421 Soil Chemistry (4 Credits)
The chemistry and composition of mineral and organic colloids in soils, including ion exchange, oxidation-reduction, acidity, surface charge, and solution chemistry. Lectures and readings pertain to plant nutrition, waste disposal, and groundwater quality.
Prerequisite: ENST200.
Credit Only Granted for: ENST421 or NRSC421.
Formerly: NRSC421.

ENST422 Soil Microbial Ecology (3 Credits)
The interdisciplinary study of soil microorganisms and their interactions with the mineral matrix; resulting in processes such as nutrient cycling, decontamination, and natural product production. We will focus on the diversity of soil communities, their survival strategies, and the new strategies used to study these communities.
Prerequisite: ENST200; or 1 course in BCHM; or must have completed a course in microbiology; or students who have taken courses with comparable content may contact the department. Jointly offered with ENS T622.
Credit Only Granted for: ENST422 or NRSC422.
Formerly: NRS C422.

ENST423 Soil-Water Pollution (3 Credits)
Reaction and fate of pesticides, agricultural fertilizers, industrial and animal wastes in soil and water with emphasis on their relation to the environment.
Prerequisite: CHEM104 and ENST200.
Credit Only Granted for: ENST423 or NRSC423.

ENST424 Field Study in Soil Morphology (4 Credits)
The fundamentals of making morphological descriptions of soils, using standard techniques, terminology, and abbreviations of the National Cooperative Soil Survey. Given a regional perspective and reasonable assumptions regarding soil properties, students should become competent to classify soils which they have described in the field and also make interpretations concerning the suitability of soils for various potential uses.
Prerequisite: ENST200.
Credit Only Granted for: ENST424 or NRSC424.
Formerly: NRSC424.
Additional Information: Students must pay a $300 course activities fee.

ENST430 Wetland Soils (3 Credits)
The soils of wetlands including hydrology, chemistry, and genesis are discussed. Federal and regional guidelines for wetland soils are covered with an emphasis on validating interpretations through field observations.
Prerequisite: ENST200.
Credit Only Granted for: ENST430, ENST630, or NRSC461.
Formerly: NRSC461.

ENST432 Environmental Microbiology (3 Credits)
Microorganisms are everywhere and mediate many of the processes that we observe everyday. These organisms are the unseen catalysts for numerous industrial processes and are critical to many emerging technologies and novel products. Environmental microbiologists ask: How do microorganisms in the environment benefit society? This course will answer this question by examining microbes in bioremediation, food safety, climate change, and biotechnology.
Prerequisite: CHEM131 and CHEM132. And BSCI170 and BSCI171; or BSCI105.
Credit Only Granted for: ENST432 or ENST499M.
Formerly: ENST499M.

ENST434 Toxic Contaminants: Sources, Fate, and Effects (3 Credits)
Study of the release to the environment, transport through natural compartments, persistence and ultimate fate of various classes of contaminants produced as a result of human activities. Topics will culminate in discussions of impacts to wildlife and human health. Students should emerge with a practical appreciation of the actual risks from exposure to a variety of environmental contaminants and an understanding of the environmental and human health implications of continuing the contaminating activities.
Prerequisite: ENST333 and ENST334.

ENST436 Emerging Environmental Threats (3 Credits)
Examine new and potential environmental concerns in the air, water, soil, space, and the built environment. Emphasis on studying the intrinsic links between ecosystem and human health. Topics will include climate change, resource consumption, biodiversity change, infectious disease, non-traditional pollutants, and other complex and significant environmental concerns.
Prerequisite: ENST233; or permission of AGNR-Environmental Science & Technology department.

ENST440 Crops, Soils and Civilization (3 Credits)
Role and importance of crop and soil resources in the development of human civilization. History of crop and soil use and management as they relate to the persistence of ancient and modern cultures.
Credit Only Granted for: ENST440 or NRSC440.
Formerly: NRSC440.

ENST441 Sustainable Agriculture (3 Credits)
Environmental, social and economic needs for alternatives to the conventional, high-input farming systems which currently predominate in industrial countries. Strategies and practices that minimize the use of non-renewable resources.
Credit Only Granted for: ENST441 or NRSC441.
Formerly: NRSC441.

ENST443 Industrial Ecology (3 Credits)
Problems of waste management and recycling in human societies are covered. The industrial ecology approach to design is contrasted with analogous patterns and processes from natural ecosystems.
Prerequisite: (MATH140 or MATH120; or must have completed MATH220); and BSCI361. Or permission of AGNR-Environmental Science & Technology department. Jointly offered with ENST643.
Credit Only Granted for: ENST443, ENST643, or MEES698J.

ENST445 Ecological Risk Assessment (3 Credits)
Assessment of ecological impacts of perturbations on natural systems. Course will describe methods for estimating environmental impacts including extrapolating from laboratory and field data. The role of regulatory agencies and implications of scientific uncertainty on risk management will be covered.
Prerequisite: ENST360 or BSCI361; and (BIOM301 and ENST334). Or permission of AGNR-Environmental Science & Technology department.

ENST450 Wetland Ecology (3 Credits)
Plant and animal communities, biogeochemistry, and ecosystem properties of wetlands. Lectures are supplemented by weekend or Friday field trips (1-3 days total during the semester) and in-class labs that emphasize collection and analysis of field data on wetland vegetation, soil, and hydrology. Wading boots (at least hip length) are strongly recommended.
Prerequisite: BIOM301; or permission of AGNR-Environmental Science & Technology department. Jointly offered with ENST650. Credit only grant ed for: ENST450 or MEES650.

ENST452 Wetland Restoration (3 Credits)
Design, construction, and evaluation of wetlands restored or created to provide ecosystem services or to mitigate losses due to development. Topics include fundamental properties of wetlands, ecological restoration theory, site selection and goal-setting, design plans, practices for establishing wetland hydrology, substrate, and vegetation, and restored ecosystem monitoring.
Prerequisite: (BSCI160 and BSCI161; or BSCI106); and (BSCI362, ENST450, ENST360, or BSCI361).

ENST453 Watershed Science: Water Balance, Open Channel Flow, and Near Surface Hydrology (3 Credits)
Concepts of surface water balance, surface radiative flux, precipitation and evaporation measurements.
Credit Only Granted for: ENST453 or ENST653.

ENST456 Spatial Analysis and Ecological Sampling (3 Credits)
Teaches ENST students ecological sampling methods and applied spatial analysis skills. Students will work in small groups on research projects they develop and test during the semester. Students will develop a research hypothesis, test their hypothesis, display it visually in QGIS, and analyze it with appropriate statistical methods in QGIS and R Studio culminating in a final presentation.
Recommended: GEOG306 and GEOG373.
Restriction: Senior standing or higher; and permission of instructor.
Credit Only Granted for: ENST456 or ENST499T.
Formerly: ENST499T.
Additional Information: Students will need to provide an 8GB (or larger) thumb drive for data storage.

ENST460 Principles of Wildlife Management (3 Credits)
Ecological principles and requirements of wildlife as basis for management, and introduction to the scientific literature. Conflicts in wildlife management, government administration of wildlife resources, legislation, and history of the wildlife management profession.
Prerequisite: Must have completed two semesters of biology laboratory; and (ENST360; or BSCI361). Or permission of AGNR-Environmental Science & Technology department.

ENST461 Urban Wildlife Management (3 Credits)
Ecology and management of wildlife in urban areas. For students in biological sciences, geography, landscape design, natural resources management, recreation and urban studies. Planning, design, and wildlife conservation in landscape ecology. Public attitudes, preferences, and values, review of private conservation organizations.

ENST462 Field Techniques in Wildlife Management (3 Credits)
Hands-on experience with field techniques in wildlife management focusing on various methods of conducting indices, estimates, and censuses of wildlife populations. Includes capture and handling of amphibians, reptiles, birds, and mammals by use of drift fences, cover boards, mist nets, box traps, and dart guns.
Prerequisite: ENST460. And BSCI160 and BSCI161; or BSCI106. And BSCI170 and BSCI171; or BSCI105.
Recommended: ENST461.
Restriction: Permission of AGNR-College of Agriculture & Natural Resources.

ENST463 Wildlife Habitat and Population Modeling (3 Credits)
Students will gain basic tools for the analysis and modeling of wildlife population demographics and wildlife habitat. This class will be broken into two components: 1) will teach students techniques of modeling wildlife field data for the purpose of estimation of key parameters such as population size, viability, and other demographic rates using programs such as Riskman, Vortex, and Mark; 2) will teach students real world techniques used to determine and model habitat use on multiple scales using statistical analyses, GIS, and stand-alone programs such as Home Ranger and Biomapper. This class is designed for wildlife and natural resources majors.
Prerequisite: ENST460 and GEOG373; and (MATH120; or must have completed MATH220). Or permission of AGNR-Environmental Science & Technology department.
Restriction: Must be in Environmental Sci & Tech program; and must be in Environmental Science and Policy program.

ENST466 Ecology and Management of Wildlife Habitats (3 Credits)
Introduction to general concepts of wildlife habitat ecology and management. Specifically,land use practices on public and private lands and how these practices influence wildlife production. Conduct wildlife habitat evaluations and options for alterations/manipulations to achieve specific management goals. The class will culminate with the creation and planning of a wildlife management plan.
Recommended: ENST460.

ENST467 Ecology and Management of Wildlife Habitats Lab (2 Credits)
An introduction to the principles of wildlife habitat data analysis applied at the population level. This class will teach students real world techniques used to determine and model habitat use on multiple scales. This lab course complements the material covered in ENST 466.
Corequisite: ENST466.

ENST470 Ideas into Impact (3 Credits)
This will be a capstone-type course based around developing proposals for projects emphasizing research, monitoring, design, restoration, managament, entrepreneurship, or other approaches to ecological or environmental questions, issues, or problems.
Restriction: Junior or Senior standing only; Permission of AGNR-Environmental Science & Technology department.

ENST471 Captsone I (2 Credits)
This course will be conducted in a group discussion format that will focus on professional project proposal preparation and presentation, critical evaluation of environmental science research, professional development, and career planning. Students will develop and present original project proposals and critique project proposals presented by others.

ENST472 Capstone (3 Credits)
This capstone course focuses on professional project preparation, presentation, and critical evaluation on environmental science research. Students will develop and present original projects and critique projects presented by others.
Restriction: Must be in a major within AGNR-Environmental Science & Technology department; and permission of AGNR-Environmental Science & Technology department.
Additional Information: This is the pinnacle course for students majoring in ENST and is therefore recommended in one of the students' final semesters.

ENST479 Tropical Ecology and Resource Management (1-6 Credits)
Tropical ecosystems and issues of human use and impact. Includes lectures which lead up to an off-campus trip in a tropical environment.
Prerequisite: Must have completed an introductory economics course. And BSCI160 and BSCI161; or BSCI106.
Restriction: Permission of instructor.
Repeatable to: 10 credits if content differs.

ENST481 Ecological Design (4 Credits)
An advanced survey course on the field of ecological design. Principles of design are illustrated with case studies from biologically-based waste treatment systems, ecosystem management and sustainable development. Concepts covered include ecology, ecological engineering, nutrient cycling, emergy, lifecycle analysis, and design process. Technologies include treatment wetlands, living machines, anaerobic digestion, rain gardens, bioswales, bioremediation, algal turf scrubbers, and green building design.
Prerequisite: (MATH120 or MATH140; or must have completed MATH220); and (PHYS121 and CHEM131); and (BSCI361; or students who have taken courses with comparable content may contact the department). Or permission of instructor.
Restriction: Permission of AGNR-Environmental Science & Technology department. Jointly offered with MEES681. Credit only grant ed for: ENST481, ENST681, or MEES681.

ENST485 Water Management in Urban Environment (3 Credits)
Historically, with the exception of certain locations, water has been available in sufficient quantities, and providing supporting infrastructure has been relatively straightforward. In urban areas, the concentration of people and the drastic changes in land use, have altered the fluxes of water, sediments, chemicals, and microorganisms. As the population increases and the number of large urban areas keeps growing (both in U.S. and internationally), managing water in urban areas is becoming more challenging. Water must be supplied for domestic, commercial, and industrial use, as well as irrigation and maintaining and enhancing local environments (e.g., urban streams). In addition, stormwater must be managed to prevent flooding and environmental damage, and used water, which contains organic matter, nutrients, and other constituents that can be extracted and reused, must be collected and managed. In this course we take a systems approach to urban water hydrology, engineering, planning and management. We will explore urban water cycle, urban runoff and drainage characteristics, urban water supply and demand, stormwater collection and treatment and designing best management practices. Additionally, we look at the climate impacts on the urban water cycle.
Prerequisite: MATH120, MATH130, MATH136, or MATH140.
Credit Only Granted for: ENST485 OR ENST489Z.
Formerly: ENST489Z.

ENST486 Senior Professional Internship (3 Credits)
Students will arrange an off-campus internship experience related to Environmental Science and Technology to develop expertise in a specific area of their ENST concentration curriculum. Classroom sessions will frame student experiences within the broader discipline of Environmental Science and Technology.
Prerequisite: ENST389.
Restriction: Must be in the Environmental Science and Technology program; and permission of AGNR-Environmental Science & Technology department.
Additional Information: The course has two types of activities: lecture and experiential learning. Students are supposed to work on their internship for 90 hours and participate in a 2-hour lecture every other week, during the semester.

ENST487 Environmental Conflicts and Decision Making (2 Credits)
Study major cases which focus on environmental science with concentration on the role and techniques of negotiation, collaborative decision making, and adaptive resource management as an environmental conflict resolution process.
Restriction: Senior standing. And must be in one of the following programs (Environmental Sci & Tech: Natural Resources Mgmt; Environmental Sci&Pol-Wildlife Ecology & Mgmt) ; or permission of AGNR-Environmental Science & Technology department.

ENST489 Research Experience (3 Credits)
An advanced research-based course in the field of environmental science and technology.
Restriction: Permission of AGNR-Environmental Science & Technology department.
Repeatable to: 6 credits.

ENST499 Special Topics in Environmental Science and Technology (1-4 Credits)
An independent study, and/or lecture, and/or laboratory series organized to study a selected phase of Environmental Science and Technology not covered by existing courses. Credit arranged with supervising faculty member.
Restriction: Permission of AGNR-Environmental Science & Technology department.

ENST602 Research Principles and Methodology in Environmental Scienceand Technolgy (3 Credits)
Fundamental research strategies and methods of investigation in Environmental Science and Technology including field and laboratory procedures.
Restriction: Must be in Environmental Sci & Tech program.

ENST603 Advanced Invasive Species Ecology (3 Credits)
We will examine ecological, evolutionary, and anthropogenic processes facilitating or resisting biological invasions, and consider their environmental, economic, and human health impacts. We will consider various management strategies to mitigate invasions and identify areas of future research. Field trips and detailed discussion of recent findings and controversies in the literature will help illustrate fundamental concepts of invasions among various ecosystems.Jointly offered with ENST403.
Credit Only Granted for: ENST403, ENST603 , or ENST689R.
Formerly: ENST689R.
Additional Information: Two field trips are planned for this class.

ENST604 Advanced Ecological and Natural Resource Ethics (3 Credits)
Bridges science and management with ethical theory and concepts to help scientists, regulators, and managers understand how to deal with potential ethical dilemmas that arise in natural resource and environmental management implementation and policy development.
Prerequisite: ENST214 and ENST360.
Recommended: ENST314, ENST410, and ENST460.
Credit Only Granted for: ENST404 or ENST604.

ENST605 Energy and Environment (3 Credits)
Role of energy in environmental and human-dominated systems and their linkage. Discussion of the historical and modern production and consumption of energy. Energy systems simulation modeling, energy analysis and energy auditing. Review of national energy policies and proposed alternatives.
Prerequisite: MATH120; or must have completed MATH220; or students who have taken courses with comparable content may contact the department. Jointly offered with ENST405.
Credit Only Granted for: ENST405, ENST605 , or MEES698Z.
Formerly: MEES698Z.

ENST606 Advanced Ecosystem Health and Natural Resource Management (3 Credits)
Explore some of the most important and current global environmental and health challenges. Investigate fundamental and new concepts from the fields of ecology, eco-epidemiology, social anthropology, and environmental and health policy, as well as interdisciplinary cross-sectorial approaches such as One Health, Eco-Health, and Planetary Health.
Restriction: Permission of AGNR-Environmental Science & Technology department.
Credit Only Granted for: ENST606 or ENST689E.
Formerly: ENST689E.
Additional Information: Priority in enrollment will be given to students in ENST program.

ENST607 Adaptation and Resilience in Cities (3 Credits)
Knowledge about the relations between urbanization and global and local challenges, such as climate change, biodiversity loss, resource deficiency, poverty, justice and health, is of key importance to move towards sustainable development and resilient systems. This course takes a trans-disciplinary approach to understanding urban questions. Urban possibilities and challenges are analyzed by using a systems approach where ecological, social, and economic aspects are integrated through a social-ecological perspective to analyze resilience and sustainability. Linkages between and perspectives from science, social-sciences, and practice are emphasized throughout the course.
Prerequisite: ENST360.
Restriction: Must be a graduate student; or permission of AGNR-Environmental Science & Technology department.
Credit Only Granted for: ENST607 or ENST689C.
Formerly: ENST689C.

ENST608 Research Methods (1-4 Credits)
Development of research viewpoint by detailed study and report on crop and soil research of the Maryland Agriculture Experiment Station or review and discussion of literature on specific agricultural problems or new research techniques.
Restriction: Permission of AGNR-Environmental Science & Technology department.
Repeatable to: 4 credits if content differs.
Credit Only Granted for: ENST608 or NRSC608.
Formerly: NRSC608.

ENST611 Advanced Principles of Soil Fertility (3 Credits)
Soil factors affecting plant growth and quality with emphasis on the bio-availability of mineral nutrients. The management of soil systems to enhance plant growth by means of crop rotations, microbial activities, and use of organic and inorganic amendments.
Prerequisite: ENST200; or students who have taken courses with comparable content may contact the department. Jointly offered with ENS T411.
Credit Only Granted for: ENST411, NRSC411, or ENST611.

ENST622 Advanced Soil Microbial Ecology (3 Credits)
The interdisciplinary study of soil microorganisms and their interactions with the mineral matrix; resulting in processes such as nutrient cycling, decontamination, and natural product production. We will focus on the diversity of soil communities, their survival strategies, and the new strategies used to study these communities.The course will include an examination of current literature in this field.
Prerequisite: ENST200; or 1 course in BCHM; or must have completed one course in microbiology; or students who have taken courses with comparable content may contact the department. Jointly offered with ENS T422.
Credit Only Granted for: ENST422 or ENST622.

ENST630 Advanced Wetland Soils (3 Credits)
The soils of wetlands including hydrology, biogeochemistry, and pedogenesis, including a focused discussion of current literature. Federal and regional guidelines for wetland soils are covered with an emphasis on validating interpretations through field observations.
Prerequisite: ENST200.
Credit Only Granted for: ENST630, ENST430, or NRSC461.

ENST640 Advanced Crops, Soils, and Civilization (3 Credits)
Explore the rise, cycling, resilience, and decline of civilizations and apply learning to modern issues in the fields of sustainability, environmental ethics, natural resource management, and agriculture. Role and importance of crop and soil resources in the development of human civilization. History of crop and soil use and management as they relate to the persistence of ancient and modern cultures.Jointly offered with ENST440.
Credit Only Granted for: ENST440 or ENST6 40.

ENST643 Advanced Industrial Ecology (3 Credits)
Problems of waste management and recycling in human societies are covered. The industrial ecology approach to design is contrasted with analogous patterns and processes from natural ecosystems.
Prerequisite: BSCI361; and permission of AGNR-Environmental Science & Technology department. Jointly offered with ENST443. Credit only grant ed for: ENST443 or ENST643.

ENST650 Advanced Wetland Ecology (3 Credits)
Plant and animal communities, biogeochemistry, and ecosystem properties of wetlands. Lectures are supplemented by field trips (normally 2 days total during the semester) and in-class labs. Hands-on activities and exercises include identification of wetland plant species, wetland mapping and delineation, and collection and analysis of field data on wetland vegetation, soil, and hydrology. Wading boots (at least hip length) are strongly recommended.
Prerequisite: BIOM301; and ENST360 or other ecology equivalent; or permission of AGNR-Environmental Science and Technology department; or permission of CMNS-Marine & Estuarine-Environmental Science Program). Cross-listed with: MEES650. Jointly offered with: ENST450, MEES650.
Credit Only Granted for: ENST450, ENST650, or MEES650.
Additional Information: Wading boots (at least hip length) are strongly recommended.

ENST681 Advanced Ecological Design (3 Credits)
An advanced survey course on the field of ecological design. Principles of design are illustrated with case studies from biologically-based waste treatment systems, ecosystem management and sustainable development.
Prerequisite: Must have completed one semester of calculus; and (CHEM131 and PHYS121). Or permission of instructor. Cross-listed with M EES681.
Credit Only Granted for: ENST481, ENST681, or MEES681.

ENST689 Special Topics (1-3 Credits)
Credit according to time scheduled and organization of the course. Organized as a lecture series on a specialized advanced topic.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: ENST689 or NRSC689.
Formerly: NRSC689.

ENST702 Environmental Science and Technology: Communication and Professional Development (2 Credits)
Training in communication and professional development to prepare students to succeed in careers within the fields of environmental science and technology. Topics will include manuscript and technical writing, job search, communication with academic and non-academic audiences, multi-disciplinary collaboration, management (project, personnel, time), professionalism, leadership, ethics, and career opportunities. Course emphasizes practical training through facilitated discussions and critique practicums.
Prerequisite: ENST602.
Restriction: Must be in Environmental Science and Technology (Master's) program; or must be in Environmental Science and Technology (Doctoral) program; or permission of instructor.

ENST722 Advanced Soil Chemistry (3 Credits)
A continuation of AGRO 421 with emphasis on soil chemistry of minor elements necessary for plant growth.
Restriction: Permission of instructor; and permission of AGNR-Environmental Science & Technology department.
Credit Only Granted for: ENST722 or NRSC722.
Formerly: NRSC722.

ENST761 Methods in Pedological Investigations (4 Credits)
This is designed to equip students with analytical tools for soil microfabric and mineralogical analysis in order to understand soil properties and processes. A number of techniques will be discussed, but emphasis will be placed on micromorphology and x-ray diffractometry. Both theoretical and applied considerations will be convered, and students will gain substantial hands on experience in collecting and interpreting data germane to their research interests.
Prerequisite: ENST414; or permission of AGNR-Environmental Science & Technology department.

ENST789 Advances in Research (1-4 Credits)
A study of recent advances in agronomy research.
Repeatable to: 4 credits if content differs.
Credit Only Granted for: ENST789 or NRSC789.
Formerly: NRSC789.

ENST798 Graduate Seminar (1 Credit)
Designed to provide a venue for interactive discussion between ENST graduate students and other members of the ENST community regarding thesis/dissertation research planned or conducted as part of the students graduate program.
Restriction: Must be in one of the following programs (Environmental Science and Technology (Doctoral); Environmental Science and Technology (Master's)) ; or permission of AGNR-Environmental Science & Technology department.
Repeatable to: 6 credits.
Credit Only Granted for: ENST798 or NRSC798.

ENST799 Master's Thesis Research (1-6 Credits)

ENST821 Advanced Methods of Soil Investigation (3 Credits)
First semester, alternate years. An advanced study of the theory of the chemical methods of soil investigation with emphasis on problems involving application of physical chemistry.
Credit Only Granted for: ENST821 or NRSC821.
Formerly: NRSC821.

ENST831 Soil Mineralogy (4 Credits)
Soil minerals, with emphasis on clay minerals, are studied from the viewpoint of soil genesis and physical chemistry. Mineralogical analyses by x-ray and chemical techniques.

ENST832 Advanced Soil Physics (3 Credits)
An advanced study of physical properties of soils.
Restriction: Permission of instructor; and permission of AGNR-Environmental Science & Technology department.
Credit Only Granted for: ENST832 or NRSC832.
Formerly: NRSC832.

ENST898 Pre-Candidacy Research (1-8 Credits)

ENST899 Doctoral Dissertation Research (1-8 Credits)

ENTM - Entomology

ENTM609 Integrated Pest Management (1-4 Credits)
A modular course with an interdisciplinary approach to the theory and practice of integrated pest management. Topics of modules, each 3-4 weeks long, vary each semester over a three year time frame, with the first module serving as a prerequisite for all other modules.
Restriction: Permission of instructor.
Repeatable to: 10 credits if content differs.

ENTM612 Insect Ecology (3 Credits)
An advanced course in population and community ecology, plant-insect interactions, and insect biogeography. Emphasis on current entomological literature.
Prerequisite: Permission of CMNS-Entomology department; or must have completed a course in general ecology.

ENTM622 Principles of Systematic Entomology (3 Credits)
The principles of systematics including traditional classification methods, cladistics, and numerical taxonomy. Nomenclature, continental drift, and speciation theory. A laboratory problem in systematics is required.

ENTM667 Aquatic Entomology (3 Credits)
Biology, ecology, and taxonomy of aquatic insects in lotic and lentic habitats, their adaptation to aquatic life, their function in aquatic ecosystems, and their relationship to environmental deterioration.

ENTM699 Advanced Entomology (1-6 Credits)
Credit and prerequisites to be determined by the department. First and second semesters. Studies of minor problems in morphology, physiology, taxonomy and applied entomology, with particular reference to the preparation of the student for individual research.

ENTM701 Effective Teaching: TA Training (1 Credit)
A survey and discussion of topics pertinent to graduate students who are first-time teaching assistants, including teaching responsibilities and policies, effective techniques of lecturing and leading discussions, composing and grading quizzes and exams, cultural diversity, time management, and development of a teaching portfolio. All teaching assistants in the College of Life Sciences must take a 701 TA training course in one of the departments.Cross-listed with BISI701.
Credit Only Granted for: ENTM701, BISI688Z, CBMG688Z, or BIOL701.

ENTM710 Insect Biodiversity, Physiology and Ecology (3 Credits)
A survey course discussing the various families of insects, discuss thing their anatomy and physiology, and their role in ecological systems. Students will examine the ecological and evolutionary perspectives on interactions between plants and vertebrate and invertebrate animals. Further, it explores the applied consequences of animal-plant interactions to agroecology and conservation biology. These goals are achieved by reviewing the theoretical underpinnings of animal-plant interactions, and exposing students to research literature on animal-plant interactions.

ENTM720 Native, Invasive, and Exotic Species (3 Credits)
This course will examine introduced species impact, how invasive and exotic species spread, their impact of native species and methods of invasive species control.

ENTM725 IPM Practices (3 Credits)
Introduction to the techniques of integrated pest management for proper pest control management. Integrated Pest Management (IPM) has been the most successful management paradigm for agriculture, forestry, and urban pest management for more than five decades. Students will learn the fundamental elements of IPM programs including recognition and monitoring of key pests, formation of decision-making guidelines, intervention tactics, and fundamentals of assessment.

ENTM730 Plant Diagnostics (3 Credits)
The first step to managing pest and disease problems in plants is an accurate diagnosis. In this course, students will learn about the various biotic (living) and abiotic (nonliving) factors that can contribute to plant problems, and how to evaluate evidence and distinguish between these factors to arrive at an accurate diagnosis.

ENTM735 Sustainability (3 Credits)
Application of the concept of sustainability to both ecosystem services provided by beneficial insects, as well as the management of injurious insects. Ecological functions of insects in the natural and anthropogenic landscape will be illustrated and discussed. In addition, case histories and discussions will focus on themes of sustainability in successful IPM programs, as well as specific practices that lead to sustainable agriculture. The course will conclude with the development of a list of sustainable practices for conserving and managing insects in the landscape.

ENTM740 Organic Practices (3 Credits)
Alternatives to chemical pesticides, what being certified organic entails and how these practices relate to ecological principles. This course will discuss various natural processes that occur in the farm setting to determine the best practices to maintain biodiversity and successful crop production.

ENTM745 Bee Biology and Beekeeping (3 Credits)
Students will be introduced to the anatomy and physiology of the honey bee colony with emphasis on how to use this information to best manage honey bee colonies.

ENTM746 Commercial Beekeeping (3 Credits)
An overview of the various components of the commercial beekeeping industry including migratory pollinators, queen rearing operations and honey producers will be explored.

ENTM747 Pollinator Health (3 Credits)
Students will be given an overview of the importance of insect pollinators and threats to their populations. Emphasis will be placed on managed pollinators, particularly but not exclusively honey bees, where disease mitigation plans will be highlighted.

ENTM751 The History and Culture of Bees and Beekeepers (3 Credits)
An exploration of the history of beekeeping in culture and literature. A comparison of past and present beekeeping practices in different regions of the world will be highlighted.

ENTM756 Insect Diseases and Pathology (3 Credits)
Integrates aspects of biochemistry, molecular biology and evolution theory with ecology using pathogens of insects as a model. The various biotic (living) and abiotic (nonliving) factors that can contribute to plant problems. Explores the direction and goals of innovation in microbial biocontrol as well as the effect of social criticism and considerations of environmental impact on attempts to introduce engineered microorganisms.
Credit Only Granted for: ENTM715 or ENTM756.
Formerly: ENTM715.

ENTM760 Insects in the 21st Century (3 Credits)
This course will explore the influence and impact of major technological advances in genetics, molecular genetics and biotechnology on the study of insects. Topics will include the use of insects as models for studying human biology and diseases; the use of genetics and genetic technologies to augment existing strategies for managing pest insects and well as the invention of novel management approaches; the use of genetics and genetic technologies in the fields of insect conservation, ecology and evolution.

ENTM769 Capstone: Scholarly Paper (3 Credits)
An examination of the current literature on topics related to the field of applied entomology. The Capstone Course provides the opportunity to apply and integrate best practices based on current research in the form of a formal scholarly paper.

ENTM788 Entomological Topics (1-3 Credits)
One lecture or one two-hour laboratory period a week for each credit hour. Lectures, group discussions or laboratory sessions on selected topics such as: aquatic insects, biological control of insects, entomological literature, forest entomology, history of entomology, insect biochemistry, insect embryology, immature insects, insect behavior, insect communication, principles of entomological research.
Prerequisite: Permission of CMNS-Entomology department.

ENTM789 Field Experience in Pest Management (1-6 Credits)
Involvement in practical problems of pest management in field situations. The student will be assigned to a problem area for intensive experience, usually during the summer. A final written report is required for each assignment.
Repeatable to: 6 credits.

ENTM798 Topic Seminar (1 Credit)
Discussion and presentation of current research and literature.
Prerequisite: Permission of CMNS-Entomology department.

ENTM799 Master's Thesis Research (1-6 Credits)

ENTM898 Pre-Candidacy Research (1-8 Credits)

ENTM899 Doctoral Dissertation Research (1-8 Credits)

ENTS - Telecommunications

ENTS609 Telecommunications Project (3 Credits)
Consists of a student project in the area of telecommunication system applications, management, or policy. Specific projects will be supervised individually by faculty members associated with the M.S Program in Telecommunications.

ENTS622 Introduction to Digital Communication Systems (3 Credits)
Principles of analog and digital communication systems design. Analysis of the performance and relative merits of different modulation and demodulation, signal processing, filtering and error control schemes in communication systems. Also provides an understanding of the design of modern digital communication systems.
Restriction: Must be in Telecommunications (Master's) program; or permission of ENGR-Electrical & Computer Engineering department.
Credit Only Granted for: ENTS622 or ENTS689B.
Formerly: ENTS689B.

ENTS625 Management and Organizational Behavior in the Telecommunications Industry (3 Credits)
Roles of the general manager in: determining target markets and designing strategies for them; formulating and implementing corporate and business level strategies; and staffing, developing, and managing human resources and coordinating them with the organization's financial and physical resources. Also emphasizes the building of interpersonal skills with respect to the selection of members for work teams and team formation, leadership of teams toward the achievement of strategic goals and total quality, the development and motivation of team members, and the evaluation of team and individual performance.

ENTS629 Special Topics in Cybersecurity (3 Credits)
Selected topics of current importance in cybersecurity.
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits if content differs.

ENTS630 The Economics of International Telecommunications (3 Credits)
Basic microeconomic principles used by telecommunications firms, including supply and demand, elasticity, costs, productivity, pricing, market structure and competitive implications of alternative market structures. Market failures and government intervention. Public policy processes affecting business operations.
Restriction: Must be in Telecommunications (Master's) program.

ENTS632 Telecommunications Marketing Management (3 Credits)
Topics covered include strategic marketing, sales and customer service challenges confronting organizations in the computer, communications and media industries. The course also addresses volatile technology, regulatory and competitive environments as a backdrop to strategic planning and management in the marketing domain.
Restriction: Must be in Telecommunications (Master's) program.

ENTS635 Decision Support Methods for Telecommunication Managers (3 Credits)
The aim of this course is to introduce management science techniques for informed decision making. Topics covered can include data analysis and regression, optimization models and applications (workforce scheduling, manufacturing, network design, facility location), sensitivity analysis, decision trees, risk analysis and business simulation models. Emphasis will be on telecommunications managerial problems, model development and the use of software packages for decision support.
Restriction: Must be in Telecommunications (Master's) program.

ENTS639 Special Topics in Business (3 Credits)
Selected topics of current importance in business.
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits if content differs.

ENTS640 Networks and Protocols I (3 Credits)
An overview of design issues and the important industry standards for digital communications networks. This includes protocols, data communications technologies, error correction and detection, congestion control, traffic routing, Local Area Network (LAN) protocols, TCP/IP, and some security issues.
Restriction: Must be in Telecommunications (Master's) program.

ENTS641 Networks and Protocols II (3 Credits)
Techniques for the specification, design, analysis, verification and testing of communication protocols are discussed. The course includes detailed discussion on routing protocols in the Internet. This includes Routing Information Protocol (RIP), Enchanced Interior Gateway Routing Protocol (EIGRP). Open Shortest Path First (OSPF), and Border Gateway Protocol (BGP4).
Prerequisite: ENTS640.
Restriction: Must be in Telecommunications (Master's) program.

ENTS649 Special Topics in Networking (3 Credits)
Selected topics of current importance in networking.
Restriction: Must be in Telecommunications (Master's) program.

ENTS653 AWS/PCS System Implementation (3 Credits)
Engineering issues associated with designing and deploying a AWS/PCS cellular wireless communications system in the current world environment will be examined. The course will focus on implementation issues such as the impact of real world concerns on the deployment strategy and the use of good engineering practice to overcome obstacles. Students will create and modify mock deployments using professional tools for cell planning and interference analysis. Students will also be exposed to drive testing tools and concepts for migration to future technologies.
Restriction: Must be in Telecommunications (Master's) program.

ENTS654 Optimization and Analysis of GSM Networks (3 Credits)
The techniques needed to successfully optimize a functioning GSM networkwill be examined. Students will conduct extensive drive tests of a working network in the Washington DC area using state-of-the-art drive test equipment and will analyze the recorded data with post-processing analysis tools. Also, they will learn to recognize problems based on network behaviors and what courses of action are available to correct them. Lab work and data collection will constitute a majority of the class work.
Prerequisite: ENTS656 or ENTS653; and permission of ENGR-Electrical & Computer Engineering department.
Restriction: Must be in Telecommunications (Master's) program.
Credit Only Granted for: ENTS654 or ENTS689B.

ENTS656 Introduction to Cellular Communication Networks (3 Credits)
Concepts and techniques involved in wireless digital communications with emphasis on cellular and PCS systems. Properties of Mobile radio channels; intersymbol interference, multipath, and fading effects; interleaving and diversity; multiple access schemes (TDMA, FDMA, CDMA); interuser interference, traffic issues, and cell capacity; power control strategies; frequency reuse and channel assignment; handoff, paging, and location update; cell layout; introduction to cellular and PCS standards.

ENTS657 Satellite Communication Systems (3 Credits)
An examination of satellite telecommunication systems with an emphasis on the mobile satellite systems (MSS). Topics will include a historical perspective, orbital mechanics and constellations, choice of orbital parameters, propagations considerations, link budgets, interference issues and other obstacles, and existing and proposed mobile satellite systems. It will also look at some of the business aspects such as the cost of deploying and maintaining these systems.
Credit Only Granted for: ENTS657 or ENTS689S.
Formerly: ENTS689S.

ENTS659 Special Topics in Communications (3 Credits)
Selected topics of current importance in communications.
Restriction: Must be in Telecommunications (Master's) program.

ENTS669 Special Topics in Computing (3 Credits)
Selected topics of current importance in computing.
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits.

ENTS670 Introduction to Business and Enterpreneurship (3 Credits)
This is a fundamental course that provides a broad introduction to various business issues faced by any small business or starup. Course instructors present the key issues involved in outlining a clear value proposition and profitable business model, managing and monitoring finances, developing a winning team, addressing legal considerations, executing on operations including marketing sales, manufacturing and service.
Restriction: Must be in Telecommunications (Master's) program.
Credit Only Granted for: ENTS670 or ENTS689J.

ENTS673 Project Management for Telecommunications (3 Credits)
Introduces modiern project management. Begins with an overview and expands into Adaptive and Extreme project management. The focus then shifts to the individual skills required to be an effective project manager, such as time management, leadership and motivation. Once skills of the individual have been addressed, social networks and how they impact project management are examined.
Formerly: ENTS689P.

ENTS689 Special Topics in Telecommunications (3 Credits)
Selected topics of current importance in telecommunications.
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits if content differs.

ENTS699 Independent Study in Telecommunications (1-3 Credits)
Individual instruction course. See ENTS program office for section number.
Repeatable to: 3 credits if content differs.

ENTS749 Advanced Topics in Networking (3 Credits)
Selected advanced topics in networking.
Prerequisite: ENTS640 or ENTS641; or permission of instructor.
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits if content differs.

ENTS759 Advanced Topics in Communications (3 Credits)
Selected advanced topics in communications.
Prerequisite: ENTS622; or students who have taken courses with comparable content may contact the department. And (ENTS656 or ENTS653).
Restriction: Must be in Telecommunications (Master's) program.
Repeatable to: 18 credits if content differs.

EPIB - Epidemiology and Biostatistics

EPIB400 Obesity: An Epidemiologic Perspective (3 Credits)
The epidemic of obesity, its causes and consequences, and issues related to energy balance will be covered. Students will characterize the obesity epidemic both nationally and internationally, compare and contrast the metrics of obesity, understand the biological consequences of different obesity phenotypes, and describe characteristics of the obesogenic environment. Throughout the course students will be introduced to the application of epidemiological methods to studies of obesity.
Prerequisite: 1 course with a minimum grade of C- from (EPIB301, HLTH301).

EPIB463 Introduction to Biostatistical Programming (3 Credits)
An introduction to basic programming principles; data analysis tasks such as the calculation of summary statistics and the creation of graphs; and the implementation of statistical analysis concepts such as T-tests, ANOVA and correlation. Querying and managing data sets using SQL in SAS will also be covered.

EPIB489 Special Topics in Epidemiology or Biostatistics (1-6 Credits)
Special topics in epidemiology or biostatistics.
Repeatable to: 6 credits if content differs.

EPIB610 Foundations of Epidemiology (3 Credits)
Introduction to the discipline of epidemiology and its applications to health issues and practices. Basic epidemiologic concepts and methods will be covered.
Prerequisite: EPIB300; or equivalent undergraduate statistics or biostatistics course with a grade of C- or higher; or a score of 70% or higher on EPIB300 placement exam.
Credit Only Granted for: EPIB610 or HLTH720.
Formerly: HLTH720.

EPIB611 Intermediate Epidemiology (3 Credits)
Analysis of epidemiologic methods as applied to epidemiologic research, analysis of bias, confounding, effect modification issues, overview of design, implementation, and analysis of epidemiologic studies.
Prerequisite: 1 course with a minimum grade of B- from (SPHL602, EPIB610); or a minimum score of 70% on the SPHL602 or EPIB610 waiver exam.

EPIB612 Epidemiologic Study Design (3 Credits)
Application of epidemiologic study designs, analytic methods used for analysis of cohort, case-control, cross-sectional, and clinical trials research.
Prerequisite: EPIB611.

EPIB620 Chronic Disease Epidemiology (3 Credits)
Overview of prevalence and risk factors for major chronic diseases. Discussion of methodological issues unique to specific chronic disease.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB621 Infectious Disease Epidemiology (3 Credits)
Overview of the unique aspects of infectious diseases and the epidemiological methods used in their study, prevention, and control.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB622 Social Determinants of Health (3 Credits)
Overview of the major social variables that affect public health, including socioeconomic status, poverty, income distribution, race, social networks/support, community cohesion, psychological stress, gender, and work and neighborhood environment.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB623 Epidemiologic Methods in Health Disparities Research (3 Credits)
An examination of the measurement, monitoring, analysis, and reporting of health disparities in the U.S. Through in-depth examples and class activities, students will learn about the state of health disparities, epidemiologic methods for health disparity assessments, and best practices for translating data on health disparities for policy makers.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB624 Genetic in Public Health (3 Credits)
Emerging role of genetics in public health; overview of basic tenets of human genetics; examination of how public health practices and research are influenced by genetics and ethical issues specific to genetics.
Prerequisite: EPIB610.

EPIB626 Epidemiology of Obesity (3 Credits)
Overview of the epidemiological, prevention, and treatment of obesity, its causes and consequences, and energy balance issues; application of epidemiologic methods to the study of obesity epidemiology.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB627 Epidemiologic Methods for Primary Research (3 Credits)
Students are provided with the knowledge and skills needed to design and implement epidemiological research studies and to collect primary data. Presents an overview of types of research designs, sampling methodologies, measurement issues, questionnaire design, and guidelines for recruiting and interacting with participants. This foundation of knowledge is applied to group assignments, which apply the steps involved in the primary data collection process. Goals include: (a) achieving competence in designing and implementing studies based on scientifically sound epidemiological research methods; and (b) gaining the ability to critically evaluate health research and epidemiological studies.
Prerequisite: EPIB610; or permission of instructor.
Credit Only Granted for: EPIB600 or EPIB627.
Formerly: EPIB660.

EPIB630 Epidemiologic Methods in Sexual and Reproductive Health Research (3 Credits)
Examination of epidemiologic methods (quantitative and qualitative) for collecting and analyzing data on sexual and reproductive health. The emphasis will be to introduce students to the appropriate methods used for challenging and sensitive research topics such as sexual behavior, HIV/STI, drug use, sexual abuse.
Prerequisite: Must have completed or be concurrently enrolled in SPHL602; or EPIB610.

EPIB631 Cancer Epidemiology (3 Credits)
This combines public health disciplines including epidemiological methods, molecular biology, pathology, clinical and social/behavioral sciences to explore modern cancer epidemiology, prevention and control in the United States and internationally. Emphasis will be placed on those cancers of high prevalence or unique biological characteristics that illustrate interesting epidemiological or etiological characteristics.
Prerequisite: EPIB610; or must have completed or be concurrently enrolled in SPHL602; or permission from instructor.
Additional Information: This course is being jointly offered with the University of Maryland Baltimore and will be taught at the College Park campus.

EPIB633 Health Survey Design and Analysis (3 Credits)
An overview of types of survey research designs, questionnaire design, measurement issues, and techniques for recruiting and interacting with participants. Students will discuss and implement a variety of health survey analysis techniques, including how to utilize SAS statistical software to estimate descriptive statistics and implement regression models, while accounting for complex survey designs.
Prerequisite: SPHL602 or EPIB610; or permission of Instructor.
Recommended: EPIB697.

EPIB634 Applied Data Analysis in Social Epidemiology and Behavioral Health (3 Credits)
Focuses on the application of factor analysis, mediation analysis using path analytic model, and structural equation model in social epidemiology and behavioral health. Application of these analytical methods using SAS.
Prerequisite: EPIB610 and EPIB650; or permission of instructor.

EPIB635 Applied Multilevel Modeling of Health Data (3 Credits)
Provides an overview of multilevel models and their application to health data. As a hybrid course, class time will be split between introducing concepts, group discussion of multilevel models in public health literature, and working through hands-on exercises. Assignments and examples will use SAS statistical software.
Prerequisite: SPHL602. Or EPIB610; and EPIB650. Or permission from Instructor.
Recommended: EPIB697; or students are recommended to have a foundation in using SAS statistical software.

EPIB636 Professional Skills and Resilience (3 Credits)
This blended course is aimed at preparing students as future epidemiologists, biostatisticians, health statisticians, or public health analysts/advisors to meet new challenges in public health and build academic resilience and successful careers. Academic resilience, or increased likelihood of (academic) success despite environmental adversities can be promoted by focusing on alterable factors such as coping mechanisms, peer and family support, social connectedness, positive role modeling and mentorship, and intellectual stimulation. Through readings, discussions and exercises, students will develop soft skills required to be successful in the workplace (e.g., how to prepare for the job search, develop professional demeanor, personal interactions). Online training will supplement in-person course content to help students build positive nurturing professional relationships and networks, maintain positivity, develop emotional insight, achieve life balance, and become more reflective. Field trips and guest lectures to introduce students to potential employers and different work environments will be identified with student input.
Restriction: Enrollment in a UMD SPH graduate degree program.

EPIB637 Social Epidemiologic Methods in Health Equity Research (3 Credits)
Provides students with the knowledge and skills to design and implement social epidemiology studies related to investigating health inequities. Presents an overview of drivers of health inequities (e.g., racism, socioeconomic status) and conceptual and methodological challenges in empirically investigating these social determinants of health including issues related to confounding, selection bias, measurement error, and evaluation of mechanisms. Covers methodological approaches that can be used to address these challenges including instrumental variable analyses, difference-in-differences, mediation analyses using inverse odds ratio weighting, and qualitative analyses. This knowledge will be applied to exploring research questions of your choice. The course will foster a co-learning environment and recognize the value and strength of interdisciplinary perspectives. Curiosity and critical thinking are encouraged and supported.
Prerequisite: SPHL602 or permission of instructor.

EPIB641 Public Health and Research Ethics (1 Credit)
Overview and discussion of ethical issues that face public health practitioners and researchers.

EPIB650 Biostatistics I (3 Credits)
Basic statistical concepts and procedures for Public Health. Focuses on applications, hands-on-experience, and interpretations of statistical findings.
Prerequisite: EPIB300; or equivalent undergraduate statistics or biostatistics course with a grade of C- or higher; or a score of 70% or higher on EPIB placement exam.
Credit Only Granted for: EPIB650, HLTH651, or HLTH688B.
Formerly: HLTH651 and HLTH688B.

EPIB651 Applied Regression Analysis (3 Credits)
An introduction to important statistical methods used in public health research, including nonparametric hypothesis testing, ANOVA, simple and multiple linear regression, logistic regression, and categorical data analysis.
Prerequisite: 1 course with a minimum grade of B- from (SPHL602, EPIB650); or a minimum score of 70% on the SPHL602 or EPIB650 waiver exam.
Recommended: EPIB697 or previous experience working with SAS is highly recommended.

EPIB652 Categorical Data Analysis (3 Credits)
Methods for analysis of categorical data as applied to public health research, including contingency tables, logistic regression, multicategory logic models, loglinear models, and models for matched-pairs.
Prerequisite: EPIB651.
Recommended: EPIB697 or previous experience working with SAS is highly recommended.

EPIB653 Applied Survival Data Analysis (3 Credits)
Overview of statistical methods for anlayzing censored survival data, including the Kaplan-Meier estimator, the log-rank test, Cox PH model.
Prerequisite: EPIB651.

EPIB654 Clinical Trials: Design and Analysis (3 Credits)
This course provides an introduction to the clinical trials design and data analysis. Topics covered include: history/background and process for clinical trial, key concepts for good statistics practice (GSP)/good clinical practice (GCP), regulatory requirement for pharmaceutical/clinical development, basic considerations for clinical trials, designs for clinical trials, classification of clinical trials, power analysis for sample size calculation for different designs, statistical analysis for efficacy evaluation, statistical analysis for safety assessment, implementation of a clinical protocol, statistical analysis plan, data safety monitoring, adaptive design methods in clinical trials (general concepts, group sequential design, dose finding design, and phase I/II or phase II/III design) and controversial issues in clinical trials.
Prerequisite: EPIB650 or SPHL602, and EPIB651; or permission of instructor.

EPIB655 Longitudinal Data Analysis (3 Credits)
Statistical models for drawing scientific inferences from longitudinal data, longitudinal study design, repeated measures and random effects to account for experimental designs that involve correlated responses, handling of missing data.
Prerequisite: EPIB651.

EPIB656 Applied Bayesian Data Analysis (3 Credits)
The theory and practical application of Bayesian statistical methods in the field of public health and related areas. A variety of models will be discussed including linear regression, multilevel model, generalized linear model, generalized linear mixed model.
Prerequisite: EPIB652 or STAT700; or permission of instructor.

EPIB657 Spatial Statistics for Public Health Data (3 Credits)
Overview three main areas of spatial statistics: point patterns, geostatistical data, and lattice (areal) data. Application of spatial statistical models including CSR, k-function, krigging, semivariogram, CAR, SAR, GWR, spatial GLM, and multilevel model to public health and environmental data analysis.
Prerequisite: EPIB651 and EPIB652; or permission of instructor.

EPIB660 Analysis of National Health Survey Data (3 Credits)
Provides background on how features such as stratification, clustering, and unequal sample selection probabilities can invalidate the assumptions underlying traditional statistical techniques, those implicitly assuming a simple random sampling with replacement design. Application using the SURVEY family of SAS/STAT procedures (Version 9.4 or later).
Prerequisite: EPIB650; or permission from Instructor.
Recommended: EPIB697.

EPIB661 Applied Multivariate Data Analysis (3 Credits)
Multivariate analysis targets data with simultaneous measurements on many variables and studies the relationship between these variables. This course introduces important multivariate analysis methods used in public health research. Topics include multivariate regression analysis, multivariate analysis of variance (MANOVA), principal component analysis (PCA), factor analysis, discriminant analysis (classification), clustering analysis, canonical correlation analysis (CCA) and correspondence analysis (CA).
Prerequisite: Must have completed EPIB651 or permission of instructor.
Recommended: Previous experience with at least one statistical software package (e.g. SAS, R, STATA). SAS is the main software package used for demonstration in class.

EPIB663 SAS Programming (3 Credits)
Learn how to analyze and summarize data using SAS. The course begins by introducing the students to basic SAS programming and data manipulation techniques. More advanced themes, such as preliminary data analysis and graphs, are explored later in the semester. Finally, the class covers the implementation of several advanced statistical concepts in SAS, including T-tests, ANOVA, non-parametric tests, regression and normality tests.
Credit Only Granted for: EPIP698E or EPIB663.
Formerly: EPIB698E.

EPIB664 Missing Data Analysis (3 Credits)
Missing data is a common problem in almost all scientific fields. Students will learn the different patterns and mechanisms of missing data, common procedures to handle missingness including weighting procedure, imputation-based procedure and model-based procedure. Useful and popular imputation methods and tools will be introduced. Numerous real data examples will be included to help students understand and solve the real world problem with missing data for different study designs.
Recommended: Previous experience with at least one statistical software (e.g. SAS, R, STATA).

EPIB670 Molecular Epidemiology of Infectious Diseases (2 Credits)
Molecular epidemiology is a discipline that uses molecular microbiology tools to study the distribution and determinants of diseases in human and animal populations. This course will provide a comprehensive overview and detailed discussion of the core molecular approaches and recent technological advances that are and can be used to investigate the etiology, transmission, and control of infectious diseases in veterinary medicine and public health. Theoretical and practical aspects of various molecular biology methods will be discussed in the context of epidemiological studies of infectious diseases including both bacterial and viral infections of veterinary and zoonotic significance. Lecture topics will cover the principles and application of various molecular techniques to problems of infectious diseases; population and evolutionary genetics of pathogenic microorganisms; data analysis and interpretation. Lecture materials will also be supported with practical data analysis, literature review discussions, which will be student-driven that will critique relevant manuscripts via group discussions in the classroom.
Prerequisite: Students planning to take this course are expected to have had some backgrounds in infectious diseases and molecular biology.
Cross-listed with: VMSC670.

EPIB672 Public Health Informatics (3 Credits)
A basic overview of Informatics and its application in a public health setting. The major goal is for students to understand the basic tools and building blocks needed to utilize this technology in order to improve their professional productivity
Restriction: Instructor permission is required for students not enrolled in a degree seeking program in the School of Public Health. Cross-listed with HLTH672.
Credit Only Granted for: HLTH670 or HLTH672 or EPIB672.
Formerly: HLTH670.
Additional Information: Course hashtag - #umdphi12.

EPIB689 Advanced Topics in Epidemiology or Biostatistics (1-6 Credits)
Special topics in epidemiology or biostatistics.
Repeatable to: 6 credits if content differs.

EPIB695 Introduction to R for Health Data Analysis (3 Credits)
A hands-on introduction to the statistical package R for health data management and analysis. The first part of the course focuses on basic and essential data manipulation and visualization using R. The second part emphasizes the use of R in statistical analyses, including summarization, correlation, chi-squared test, t-tests, ANOVA, simple and multiple regression. Students will also learn fundamental R language programming to perform user-defined calculations. No previous knowledge of R or of statistical analysis are assumed.

EPIB697 Public Health Data Management (3 Credits)
This course is designed to provide students with the expertise needed to effectively manage research data using SAS as the statistical programming language.
Prerequisite: Permission of instructor.

EPIB698 Special Topics in Epidemiology and Biostatistics (1-3 Credits)
Open to master or doctoral students who desire to pursue special topics in Epidemiology and Biostatistics.

EPIB710 Grantsmanship for Epidemiologic Research (3 Credits)
In-depth study of the knowledge and skills needed to design, conduct, and evaluate an epidemiologic research study. Development of a complete research project.
Prerequisite: EPIB650, EPIB610, EPIB612, EPIB651, and EPIB611.

EPIB740 Advanced Methods in Epidemiology (3 Credits)
In-depth investigation of epidemiologic methods for making causal inferences and solving complex methodological problems. Multivariate models emphasized.
Prerequisite: EPIB650, EPIB610, EPIB612, EPIB651, and EPIB611.

EPIB778 Internship in Public Health (1-4 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Prerequisite: Permission of SPHL-Epidemiology & Biostatistics department.
Repeatable to: 4 credits.
Credit Only Granted for: EPIB785 or EPIB778.

EPIB786 Capstone Project in Public Health (3 Credits)
Capstone experience providing opportunity to apply knowledge and skills to a specific public health problem or issue. Completion of project relevant to public health under the direction of an advisor.
Prerequisite: Permission of SPHL-Epidemiology & Biostatistics department.

EPIB788 Critical Readings in Epidemiology and Biostatistics (1-3 Credits)
Open to master and doctoral students to discuss critical readings in Epidemiology and Biostatistics.
Prerequisite: Must have completed or be concurrently enrolled in EPIB610.
Repeatable to: 6 credits if content differs.

EPIB798 Independent Study (1-6 Credits)
Master or doctoral students who desire to pursue special research problems under the direction of a faculty memeber of the department may register for 1-6 hours of credit under this number.
Prerequisite: Permission of SPHL-Epidemiology & Biostatistics department.
Repeatable to: 9 credits if content differs.

EPIB799 Master's Thesis Research (1-6 Credits)

EPIB898 Pre-Candidacy Research (1-8 Credits)

EPIB899 Doctoral Dissertation Research (1-8 Credits)

FILM - Film Studies

FILM410 Documentary and Narrative (3 Credits)
An examination of the relationship between film and reality, focusing on documentary film.
Prerequisite: ENGL245, FILM245, or CINE245; or permission of ARHU-School of Languages, Literatures, and Cultures department. Cross-listed with: SLLC410.
Credit Only Granted for: SLLC410, CINE410 or FILM410.
Formerly: FILM410.

FILM411 Experimental Film (3 Credits)
Introductory survey of European and U.S. American experimental cinema.Cross-listed with: SLLC411.
Credit Only Granted for: SLLC411, CINE411 or FILM411.
Formerly: FILM411.

FILM412 Animation and Cinema (3 Credits)
An examination of animation in art, cinema, and other media.
Prerequisite: ENGL245, FILM245, or CINE245; or permission of ARHU-College of Arts & Humanities.
Credit Only Granted for: CINE412, FILM412 or ENGL468C.
Formerly: FILM412.

FILM419 Special Topics in Documentary, Animation, Experimental Cinema, and Other Media (3 Credits)
Advanced studies in Documentary, Animation, Experimental Cinema, and Other Media. Examines the possibilities of non-narrative cinema, or cinema that is structured differently from the fiction feature film, as well as other media (television, digital imagery, and photography) that entertain a close relationship with cinema in terms of form, content, and audience. Content varies.
Prerequisite: ENGL245, FILM245, or CINE245; and or permission of ARHU College of Arts and Humanities.
Repeatable to: 6 credits if content differs.
Formerly: FILM419.

FILM420 French Cinema: A Cultural Approach (in Translation) (3 Credits)
A study of French culture, civilization, and literature through the medium of film. Taught in English.Cross-listed with: FREN480.
Credit Only Granted for: FREN480, CINE420 or FILM420.
Formerly: FILM420.

FILM421 Francophone African Film (3 Credits)
Imaginary and Memory in the reality of Francophone African Film from 1960-present. Taught in English.Cross-listed with: FREN421.
Credit Only Granted for: FREN421, CINE421 or FILM421.
Formerly: FILM421.

FILM423 Women and French Cinema (3 Credits)
Cultural identity, social boundaries and gender roles in French film as well as introduction to film textual analysis and diverse film theories (semiotics, film and psychoanalysis, feminist film theory, structuralism, narratology, spectatorship and cultural studies). Taught in French.Cross-listed with: FREN423.
Credit Only Granted for: FREN423, CINE423 or FILM423.
Formerly: FILM423.

FILM426 Modern Chinese Film and Visual Culture (3 Credits)
Modern Chinese culture, society, and history studied through examples of art, film, and visual culture.Cross-listed with: ARTH484.
Credit Only Granted for: ARTH484, CINE426 or FILM426.
Formerly: FILM426.

FILM427 Visions and Fictions from Spain (3 Credits)
Overview of Spanish Cinema from the end of the 19th century through present day Spain. Exploration of the production of literary and cinematic texts in their sociohistorical, political, religious and cultural contexts. Taught in Spanish.
Prerequisite: SPAN331, SPAN332, or SPAN333; or students who have taken courses with comparable content may contact the department; or permission of ARHU-Spanish & Portuguese Languages & Literatures department. Cross-listed with: SPAN427.
Credit Only Granted for: CINE427, FILM427 or SPAN427.
Formerly: FILM427.

FILM429 Special Topics in National/International Cinemas (3 Credits)
Courses in National/International Cinemas may examine one or more national cinematic traditions (including Hollywood cinema), or may look across traditions comparatively, for example at international and/or transnational phenomena. Content varies.
Repeatable to: 6 credits.
Formerly: FILM429.

FILM430 Critical Issues in Israeli Cinema (3 Credits)
Critical investigation of Zionist and Israeli culture and politics through film.Cross-listed with: HEBR430.
Credit Only Granted for: HEBR430, CINE430 or FILM430.
Formerly: FILM430.

FILM431 Italian Cinema II (In Translation) (3 Credits)
A study of Italian society and culture through the medium of film from the mid 1970's to the present. Taught in English.Cross-listed with: ITAL473.
Credit Only Granted for: ITAL473, CINE431 or FILM431.
Formerly: FILM431.

FILM433 Holocaust in Italian Literature and Cinema (3 Credits)
Review of literature and theoretical writings of Italy's most famous survivor, Primo Levi, to a sampling of Italian films that focus in vastly different and often extremely controversial ways on the experience of the concentration camp, while addressing a series of central questions from the brutal realities of the camps to the "compromises" made in order to survive, the need to bear witness, and the idea of the survivor's guilt.Cross-listed with: ITAL433.
Credit Only Granted for: CINE433, FILM433 or ITAL433.
Formerly: FILM433.

FILM441 Italian Cinema I: Neorealism (3 Credits)
Explores representations of Italy in cinema with special focus on identity formation and the movement of Italian neorealism and post neorealism. Taught in English.Cross-listed with: ITAL436.
Credit Only Granted for: CINE441, FILM441 or ITAL436.
Formerly: FILM441.

FILM451 Film Noir and American Culture (3 Credits)
Introduction to a variety of American movies made in the 1940s and 1950s whose dark themes and stark black-and-white lighting led to their identification as film noir.
Prerequisite: ENGL245, FILM245, or CINE245; or permission of ARHU-College of Arts & Humanities.
Credit Only Granted for: CINE451 or FILM451.
Formerly: FILM451.

FILM452 The Origins of Cinema (3 Credits)
An in-depth engagement with the specificity of early cinema, dedicated to a comparative framework that compares the early cinema period (1890-1915) to other moments of media emergence, both before and after cinema, with special emphasis on the current, "digital" moment.
Prerequisite: ENGL245, FILM245, FILM283, or SLLC283; or permission of Film Studies Program.
Credit Only Granted for: CINE452, FILM452 or ENGL468G.
Formerly: FILM452.

FILM459 Special Topics in Genres/Auteurs/Cinema Movements (3 Credits)
Special topics in genres, auteurs, and cinema movements.
Repeatable to: 6 credits.
Formerly: FILM459.

FILM461 Political Cinema (3 Credits)
Histories of cinema and politics in the 20th century.
Prerequisite: ENGL245, FILM245, or CINE245; or permission of ARHU-School of Languages, Literatures, and Cultures department. Cross-listed with: SLLC461.
Credit Only Granted for: CINE461, FILM461 or SLLC461.
Formerly: FILM461.

FILM462 Realism and the Real in Film (3 Credits)
Exploration of the problem of realism, one of the most central theoretical issues in film studies.
Prerequisite: ENGL245, FILM245, or CINE245; or permission of instructor.
Credit Only Granted for: CINE462 or FILM462.
Formerly: FILM462.

FILM463 Screening Time: History and Memory in Cinema (3 Credits)
An examination of the ways and techniques with which cinema produces a sense of time in the viewer.
Prerequisite: ENGL245, FILM245, or CINE245; or permission of ARHU-College of Arts & Humanities. Cross-listed with: SLLC463.
Credit Only Granted for: SLLC463, CINE463 or FILM463.
Formerly: FILM463.

FILM464 The Violence of Cinema (3 Credits)
An investigation of cinema's multifaceted relationship to violence.
Prerequisite: ENGL245, FILM245, or CINE245; or permission of instructor.
Credit Only Granted for: CINE464 or FILM 464.
Formerly: FILM464.

FILM469 Special Topics in Film Theories II (3 Credits)
Special topics in film theories.
Repeatable to: 6 credits.
Formerly: FILM469.

FILM499 Directed Study in Cinema and Media Studies (1-3 Credits)
Readings and Research in Film Studies under faculty supervison.
Prerequisite: Permission of instructor.
Repeatable to: 9 credits if content differs.
Formerly: FILM499.

FMSC - Family Science

FMSC420 African American Families (3 Credits)
Examination of the history, structure, cultural foundation, and diversity of African American family life is the focus of this class. Presentations and discussions enable students to identify, analyze, and assess: (1) the major theoretical perspectives used in the study of African American families; (2) the impact of social policy on African American families; and (3) specific areas of family life (e.g., marriage and divorce, parenting, child development, health disparities).
Recommended: FMSC330.
Credit Only Granted for: FMSC420 or FMSC498F.
Formerly: FMSC498F.

FMSC425 Military and Veteran Family Services (3 Credits)
Overview of issues impacting contemporary military families including during times of war. Identification of challenges faced by military families related to deployment/reunion and mental and physical health, as well as support systems available. Examination of skills and strategies for working with service members, veterans, and military families.
Recommended: Moderate level of computer literacy, especially Internet and ELMS. Reliable computer and Internet access.
Credit Only Granted for: FMSC425 or FMSC498W.
Formerly: FMSC498W.

FMSC430 Gender Issues in Families (3 Credits)
The development of historical, cultural, developmental, and psychosocial aspects of masculinity and femininity within the context of contemporary families and the implications for interpersonal relations.
Prerequisite: SOCY100, SOCY105, or PSYC100.

FMSC431 Family Crises, Emergencies and Interventions (3 Credits)
Examines the stressors in life that may lead families into a state of crisis or emergency and what can be done to help families when the need arises. Both internal stressors, such as substance abuse, finances, divorce, illness or parent-child conflict, and external stressors, such as community violence and natural disasters, are examined. Using theories and techniques for intervention and enhancement, the course examines factors involved in stressors turning into a family crisis and how factors such as emergency preparedness, social support and public policy can be a source of family resilience or protect families from negative outcomes.
Prerequisite: PSYC100.

FMSC432 Adult Development and Aging in Families (3 Credits)
Theory, research, history, and programming related to adult development and aging in the intergenerational context of family.
Prerequisite: PSYC100; and (SOCY100 or SOCY105). And FMSC332; or must have completed a comparable development course.
Restriction: Must be in a major within SPHL-Family Science department.
Credit Only Granted for: FMSC432 or FMST432.
Formerly: FMST432.

FMSC440 Death and Loss in Family Life (3 Credits)
Examination of how families experience grief and loss resulting from the death of a family member, including health and financial consequences. Overview of historical, social, psychological, cultural, medical, and legal dimensions of death in families from diverse backgrounds. Exploration of how the health care system and funeral home industry assist families in managing death and loss.
Recommended: Moderate level of computer literacy, especially Internet and ELMS. Reliable computer and Internet access.
Credit Only Granted for: FMSC440 or FMSC498B.
Formerly: FMSC498B.

FMSC445 Sexuality: Issues in Family Therapy and Service Delivery (3 Credits)
Typical, dysfunctional, and pathological sexual functioning, including effects on individuals, couples, and family systems. Sensitizes students to sexual issues, explores how perceptions of such issues affect work with people, and emphasizes implications for marriage and family therapy.
Prerequisite: A basic course in human sexuality; and permission of instructor. Jointly offered with FMSC645.
Credit Only Granted for: FMSC445 or FMSC645.

FMSC460 Violence in Families (3 Credits)
Theories of child, spouse, and elder abuse in the family setting. Emphasis on historical, psychological, sociological and legal trends relating to physical, emotional, and sexual abuse. Introduction to methods for prevention and remediation.
Prerequisite: SOCY100, SOCY105, or PSYC100.
Credit Only Granted for: FMSC460 or FMST460.
Formerly: FMST460.

FMSC477 Internship and Analysis in Family Science (3 Credits)
A supervised internship and a seminar requiring analysis. Opportunities to integrate theory and practice including 120 hours of contracted field experience. Summer or fall internship contracts due May 1; Spring contracts due December 1. See department for application procedures.
Prerequisite: FMSC383; and 9 credits in FMSC courses; and permission of SPHL-Family Science department.
Restriction: Must be in a major within SPHL-Family Science department.
Credit Only Granted for: FMSC477, FMST347, or FMST477.
Formerly: FMST477.

FMSC485 Introduction to Family Therapy (3 Credits)
The fundamental theoretical concepts and clinical procedures of marital and family therapy including premarital and divorce therapy issues.
Prerequisite: FMSC330; or 1 course from PSYC300-499 course range.
Credit Only Granted for: FMSC485 or FMST485.
Formerly: FMST485.

FMSC486 Law, Public Health and the Cuban Family (4 Credits)
A short-term summer study abroad course that is a comparative law and public health course. Students travel to Havana, Cuba to compare family problems in a capitalist versus socialist society within the context of legal, public health, social, cultural and economic changes.
Recommended: FMSC487. Jointly offered with: FMSC686.
Credit Only Granted for: FMSC486, FMSC686 or MIEH698B.
Additional Information: This is a study abroad course which will primarily occur in Cuba. Additionally, the course involves an online component prior to and following the trip.

FMSC487 Family Law (3 Credits)
Designed for students interested in studying the law, public health, and family science, this course provides students with a general overview of family law and the impact on healthy families. The course also includes the study of cutting-edge issues such as marriage equality, assisted reproduction and ethical issues that may arise.

FMSC498 Special Topics: Family Science (1-3 Credits)
Special course topics in family studies.
Prerequisite: Permission of SPHL-Family Science department.
Repeatable to: 6 credits if content differs.
Formerly: FMST498.

FMSC600 Family Theories (3 Credits)
An overview of the theoretical frameworks underlying research on the family. Survey of research findings.
Credit Only Granted for: FMSC600 or FMST600.
Formerly: FMST600.

FMSC606 Ethnic Families and Health Disparities (3 Credits)
Historical, psychosocial, economic, and political factors influencing the structure and functioning of ethnic families. Overview of racial and ethnic health disparities over the life course and ways in which they are influenced by multi-level contextual factors.
Credit Only Granted for: FMSC606 or FMST606.
Formerly: FMST606.

FMSC610 Research Methods in Family Science (3 Credits)
Research methods in family science. The role of theory, design, use of qualitative and quantitative measurement techniques, data collection and data analysis. Development of research proposals.
Prerequisite: EDMS645; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: FMSC610 or FMST610.
Formerly: FMST610.

FMSC612 Reproductive and Perinatal Epidemiology (3 Credits)
Focuses on current research, controversial issues and methodological problems in the epidemiology of reproductive and perinatal health. Includes a critical review in the broader context of reproductive and perinatal health within families and communities.
Prerequisite: Must have completed a graduate course in epidemiology with a B- or higher.

FMSC640 Family Therapy: Theory and Techniques (3 Credits)
Overview of fundamental theoretical concepts and clinical procedures in marital and family therapy, with an emphasis on those therapies which operate from a family systems perspective.
Credit Only Granted for: FMSC640 or FMST640.
Formerly: FMST640.

FMSC641 Couples Therapy, Theory, and Techniques (3 Credits)
Overview of theoretical models of couple relationships and methods of facilitating growth and interaction within those relationships. Emphasis on couples with conflicting needs and expectations, and dysfunctional communication and conflict negotiation skills.
Prerequisite: FMSC640.
Credit Only Granted for: FMSC641 or FMSC641.
Formerly: FMST641.

FMSC642 Normal and Abnormal Individual and Family Development (3 Credits)
Normal development and psychopathology in the family system. Emphasis on parent-child relationships and application of the current Diagnostic and Statistical Manual of Mental Disorders (DSM) to family therapy.
Prerequisite: FMSC640.
Credit Only Granted for: FMSC642 or FMST642.
Formerly: FMST642.

FMSC645 Sexuality: Issues in Family Therapy and Service Delivery (3 Credits)
Typical, dysfunctional, and pathological sexual functioning: effects on individuals, couples, and family systems. Sensitizes students to sexual issues, explores how perceptions or such issues affect work with people, and emphasizes implications for marriage and family therapy.
Prerequisite: Must have completed a basic course in human sexuality.
Restriction: Permission of instructor. Jointly offered with FMSC445.
Credit Only Granted for: FMSC445 or FMSC645.

FMSC646 Sex Therapy: Theory, Skills, and Practice (3 Credits)
Introduction to the theory and practice of sex therapy, including information about human sexual function and dysfunction and appropriate intervention methods. Emphasis on the relationship and the dynamics of sexual functioning within that system.
Prerequisite: FMSC645; or permission of SPHL-Family Science department.

FMSC647 Theory and Techniques of Family Mediation (3 Credits)
An introduction to family mediation as an approach to helping families deal effectively with the issues associated with separation and divorce. Theory, practice, and techniques of negotiation, with an emphasis on custody, property division, and the constructive restructuring of family relationships.
Credit Only Granted for: FMSC647 or FMST647.
Formerly: FMST647.

FMSC650 Ethical, Legal, and Professional Principles in Couple and Family Therapy (3 Credits)
This course offers an introduction to the basic principles and practices in couple and family therapy. It covers major theoretical approaches to couple and family therapy, linking core concepts to practical aspects of assessment and treatment. Readings, didactic presentations by the instructor, and class discussions are designed to build students' knowledge of both generic therapy skills and specific techniques within each theoretical model. Emphasis is given to professional ethics, standards, and clinical skills/techniques necessary for the beginning family practitioner. Students become familiar with professional ethical codes as well as ethical decision-making models and how to apply them in clinical practice. In-class roleplays are used for practicing specific assessment and treatment methods, as well as for gaining experience in responding appropriately to a variety of common professional and ethical issues that arise in clinical practice.
Prerequisite: Permission of SPHL-Family Science department.
Restriction: Must be in Couple and Family Therapy (Master's) program.

FMSC651 Treatment of Emotional and Mental Disorders in Family Systems (3 Credits)
This course is designed to assist beginning therapists in developing their knowledge of the major theoretical approaches to family therapy and applying those approaches to their clinical work. In addition, the course addresses many procedural, professional, and ethical issues often faced by beginning therapists. Towards these ends, the primary foci of the course will be on developing competencies in (a) observing family process, (b) assessing and conceptualizing family strengths and problems from different theoretical models, and (c) developing treatment plans from these different theoretical models. Finally, attention will also be given to therapist self-care.
Prerequisite: FMSC650.
Restriction: Must be in Couple and Family Therapy (Master's) program.

FMSC652 Psychopathology and Diagnosis in Family Systems (3 Credits)
The purpose of this course is to assist intermediate family therapists in further developing their knowledge, clinical, and professional expertise by deepening their understanding of major child and adult psychopathology. Further, students will learn to apply this knowledge to their clinical work, particularly in addressing individual family members' psychopathology within the context of family relationships. Major foci of the course include assessment and diagnostic interviewing in family therapy, and intervention with forms of psychopathology such as depression, anxiety disorders, substance abuse, and major mental disorders with clients who present for couple and family therapy.
Prerequisite: FMSC651.
Restriction: Must be in Couple and Family Therapy (Master's) program.

FMSC653 Advanced Application of CFT Models and Techniques (3 Credits)
This course is an integration of advanced assessment, diagnosis, and treatment procedures with couples, families, individuals, and groups. Emphasis will be on the following areas: (1) the advanced study of classic and emerging CFT models; (2) special topic areas (e.g., trauma, religious differences, grief & loss, family rituals,) and/or collaborative CFT in varied settings (e.g., schools, medical facilities, in-home/family preservation work, foster care, alcohol & drug centers); (3) development of a personal theory/philosophy of family therapy along with a case management system for that model. Additionally, development of the self of therapist, contributions to CFT as a profession, and employment as well as independent practice information including resume development, licensing laws and regulations in Maryland and other states will be explored. Also, procedures for preparing for the National MFT licensing exam will be discussed. Advanced professional practice will be demonstrated in case presentations related to the specific areas emphasized in the course.
Prerequisite: FMSC652.
Restriction: Must be in Couple and Family Therapy (Master's) program.

FMSC654 Clinical Marriage and Family Therapy Practice (3 Credits)
Application of theory and technique to the clinical practice of marriage and family therapy. Emphasis on case management and clinic administration. Includes completion of 12 successive months and 500 hours of supervised, direct client contact with couples, families, and individuals from an integrative family systems perspective.
Prerequisite: FMSC651.
Restriction: Must be in Couple and Family Therapy (Master's) program.
Credit Only Granted for: FMSC654 or FMST654.
Formerly: FMST654.

FMSC658 Supervised Clinical Practice in Couple and Family Therapy (1-3 Credits)
This course is designed to provide supervision of family, couple, and individual therapy client contact. This course is limited to, and required of, all students admitted to the Couples and Family Therapy (CFT) Program. Supervision utilizes various family systems models and differing methods are employed.
Prerequisite: FMSC650.
Restriction: Permission of instructor.
Repeatable to: 12 credits if content differs.

FMSC660 Program Planning and Evaluation in Family Science (3 Credits)
Theory and methods of program planning and evaluation with special emphasis on family programs. Assessment of program goals and the social and psychological factors involved in program implementation. Methods for measuring the effectiveness of program delivery, as well as the impact of services on family functioning.
Credit Only Granted for: FMSC660 or FMST660.
Formerly: FMST660.

FMSC668 Special Topics in Family Sciences (1-3 Credits)

FMSC686 Law, Public Health and the Cuban Family (4 Credits)
A comparison of family problems in the United States, a capitalist society, with Cuba, a socialist one, as evaluated within the context of legal, public health, social, cultural, and economic changes. The highlight of the course is time spent in Havana, Cuba where students may gain first-hand knowledge of these issues through visits to a hospital, fertility clinic, rural doctor's office, medical school, law offices, museums, and a slave rebellion site and while meeting with the U.S. Ambassador in Cuba, Cuban judges, lawyers, doctors, professors, and health care professionals and the Cuban people as their host families and beyond.Jointly offered with: FMSC486.
Credit Only Granted for: FMSC486, FMSC686 or MIEH698B.
Additional Information: This is a summer short-term faculty-lead study abroad course which will primarily occur in Cuba. Additionally, the course involves an online component prior to and following the trip.

FMSC689 Research Internship (1-3 Credits)
Research experience resulting in a scholarly article suitable for publication in a peer-reviewed journal.
Prerequisite: Permission of instructor; and permission of SPHL-Family Science department.
Repeatable to: 3 credits if content differs.
Formerly: FMST689.

FMSC698 Advanced Topics in Family Science (1-3 Credits)
Arranged group study on specific topic which may vary from term to term.
Repeatable to: 12 credits.
Formerly: FMST698.

FMSC699 Independent Study (1-6 Credits)
Prerequisite: Permission of SPHL-Family Science department.
Restriction: Permission of instructor.
Repeatable to: 6 credits.
Formerly: FMST699.

FMSC710 Maternal and Child Health from a Life Course Perspective (3 Credits)
Survey of current science in maternal and child health informed by a life course perspective. The surveyed topics include inutero exposure to toxins, feeding and growth, and effects of chronic stress, maternal and child health.
Credit Only Granted for: FMSC710 or FMST710.
Formerly: FMST710.

FMSC720 Study Design in Maternal Child Health Epidemiology (3 Credits)
A detailed survey of key epidemiologic study designs provided through readings, lectures, and exercises. Lectures begin by considering the evolution of epidemiologic thought and parallel developments in design of epidemiologic studies. Topics covered include assessment of causality in observational studies, investigation of acute outbreaks, survey design, cohort and case-control study designs, clinical randomized trials, and discussion of issues pertaining to measurement error in the assessment of exposures and outcomes in epdemiologic studies.
Prerequisite: EPIB610.
Restriction: Permission of the Family Sciences department.
Credit Only Granted for: EPIB612 or FMSC720.

FMSC730 Key Topics in Maternal and Child Health (3 Credits)
Review of key issues on the frontier of maternal and child health research and practice within broad public health and socio-cultural context. Examines current maternal and child health issues such as ethics, child and family health, health and socioeconomic disparities, child nutrition and obesity, military family health, and global health.
Restriction: Permission of instructor.

FMSC745 Gender and Ethnicity in Family Therapy and Service Delivery (3 Credits)
Major critiques of sources of racial, cultural, and gender bias in marital and family therapy and family service delivery. Addresses these issues in program development and clinical practice.
Credit Only Granted for: FMSC745 or FMST745.
Formerly: FMST745.

FMSC750 Family and Health Policy (3 Credits)
Development and analysis of public policies affecting the health and well-being of children, youth, and families, with an emphasis on low income and ethnic minority populations. Examination of social, economic, and political dynamics that influence family and health policies and the delivery of health care. Introduction to health advocacy within the US public health system.
Credit Only Granted for: FMSC750 or FMST750.
Formerly: FMST750.

FMSC758 Supervision of Marriage and Family Therapy Supervision (1-3 Credits)
Designed to provide supervision of marriage and family therapy supervision. Limited to students who have completed a Marriage and Family Therapy (MFT) Program or its equivalent, have completed an approved MFT supervision course, and are supervisors-in-training. Supervised supervision will incorporate various family systems, models and methods.
Prerequisite: Permission of SPHL-Family Science department.
Repeatable to: 12 credits if content differs.
Formerly: FMST758.

FMSC760 Legal Issues & Families (3 Credits)
Analysis of marriage and family issues from a legal perspective. Review of legal decisions affecting families, including procreative rights, marriage, termination of marriage, parental and child rights, adoption, child custody, and child/family medical treatment. Relationship between family law and family policy.
Credit Only Granted for: FMSC760 or FMST760.
Formerly: FMST760.

FMSC780 Qualitative Methods in Family and Health Research (3 Credits)
Theoretical perspectives and methodological tools to conduct research with individuals and families across the life span. Review of research designs, participant fieldwork, observation and interview projects, data collection, computer-assisted data analysis, and development of grounded theory.
Restriction: Permission of the Family Sciences department.
Credit Only Granted for: FMSC780 or FMST780.
Formerly: FMST780.

FMSC789 Non-Thesis Research (1-3 Credits)
Non-thesis option research papers.
Repeatable to: 6 credits if content differs.
Formerly: FMST789.

FMSC790 Marriage and Family Therapy Supervision (3 Credits)
Theory and research in supervision of marriage and family therapy. Emphasis on major models, articulation of personal model, and demonstration of perceptual, conceptual, and executive skills in marriage and family therapy supervision. Designed to meet the didactic course component of the designation of Approved Supervisor of the American Association for Marriage and Family Therapy.
Prerequisite: Permission of SPHL-Family Science department.
Credit Only Granted for: FMSC790, FMST690, or FMST790.
Formerly: FMST790.

FMSC799 Master's Thesis Research (1-6 Credits)
Formerly: FMST799.

FMSC810 Theory in Family Systems and Family Health (3 Credits)
Theory and research on family interaction and family coping with normative health and mental health transitions and non-normative crises across the family life cycle. Micro-analysis of family process in communication, decision-making, problem-solving, and compliance to health regimens. Examination of dysfunctional patterns and effective coping strategies.
Restriction: Permission of instructor.
Credit Only Granted for: FMSC810, FMST698P, or FMST810.
Formerly: FMST810.

FMSC820 Advanced Quantitative Methods in Family and Health Research (3 Credits)
This seminar is designed to help students understand, evaluate, and develop research conceptualization and design relevant to family science and family health. By the end of the course, students will be able to critique and develop theoretically grounded quantitative research in their respective area of study. Throughout the course, students will be exposed to a broad range of advanced methods that are core to the field of family science. The course will train students on how to conceptualize and develop rigorous empirical research studies relevant to family science and family health.
Recommended: Basic knowledge regarding social science research methods, study design, univariate and bivariate statistics, and family theory.

FMSC850 Maternal & Child Health Epidemiology (3 Credits)
Determinants and trends in Maternal and Child Health, including analysis of the role of economic inequalities, race and ethnicity, community contexts, and psychosocial factors across the life course. Overview of methods and data systems used to monitor Maternal and Child Health. Development of a complete population health study.
Restriction: Permission of instructor.
Credit Only Granted for: FMSC850, FMST698P, or FMST850.
Formerly: FMST850.

FMSC879 Preparing Future Faculty and Professionals Seminar (1 Credit)
Development of skills necessary to obtain and succeed in academic and non-academic positions in family science and public health. Topics include: career mapping, networking, teaching/teaching portfolios, independent research, publishing, grant writing, program and policy evaluation, consulting, job search, interviewing and negotiation, mentoring, diversity, work-family balance, and ethical issues in the workplace. Periodic visits to universities and government/nonprofit employers.
Restriction: Must be in one of the following programs (Family Science (Doctoral); Maternal and Child Health (Doctoral)).
Repeatable to: 4 credits.

FMSC898 Pre-Candidacy Research (1-8 Credits)
Formerly: FMST898.

FMSC899 Doctoral Dissertation Research (1-8 Credits)
Formerly: FMST899.

FOLA - Foreign Language

FREN - French

FREN400 Applied Linguistics (3 Credits)
The nature of applied linguistics and its contribution to the effective teaching of foreign languages. Comparative study of English and French, with emphasis upon points of divergence. Taught in French.
Prerequisite: FREN301; or permission of ARHU-French & Italian Languages & Literatures department.

FREN407 History of the French Language (3 Credits)
Evolution of the French language from Latin to modern French. Taught in French.
Prerequisite: FREN351 or FREN352; or permission of ARHU-French & Italian Languages & Literatures department.

FREN421 Francophone African Film (3 Credits)
Imaginary and Memory in the reality of Francophone African Film from 1960-present. Taught in English.Cross-listed with: CINE421.
Credit Only Granted for: FREN421, CINE421 or FILM421.
Formerly: FILM421.

FREN423 Women and French Cinema (3 Credits)
Cultural identity, social boundaries and gender roles in French film as well as introduction to film textual analysis and diverse film theories (semiotics, film and psychoanalysis, feminist film theory, structuralism, narratology, spectatorship and cultural studies). Taught in French.Cross-listed with: CINE423.
Credit Only Granted for: FREN423, CINE423 or FILM423.
Formerly: FILM423.

FREN429 Studies in French Literature and Culture of the Renaissance (3 Credits)
Selected topics in French literature of the Renaissance.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN439 Studies in 17th Century French Literature and Culture (3 Credits)
Selected topics in seventeenth-century French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN449 Studies in 18th Century French Literature and Culture (3 Credits)
Selected topics in eighteenth-century French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN459 Studies in 19th Century French Literature and Culture (3 Credits)
Selected topics in nineteenth-century French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN469 Studies in 20th Century French Literature and Culture (3 Credits)
Selected topics in twentieth-century French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN471 The Construction of French Identity I: From the Origins to the Age of Versailles (3 Credits)
French life, customs, culture, traditions (800-1750).
Prerequisite: FREN387; or permission of ARHU-French & Italian Languages & Literatures department.

FREN472 The Construction of French Identity II: From the Revolution to the Early Twentieth Century (3 Credits)
French life, customs, culture, traditions (1750 to the early twentieth century).
Prerequisite: FREN387; or permission of ARHU-French & Italian Languages & Literatures department.

FREN473 The Construction of French Identity III: Cross-Cultural Approaches to the Study of Contemporary French Society (3 Credits)
Patterns of communication, mythology, and ideology in modern France, from the Third Republic to the present, through historical and cross-cultural approaches, with reference to the Francophone world.
Prerequisite: FREN387; or permission of ARHU-French & Italian Languages & Literatures department.

FREN474 Contemporary France: A Sociocritical Approach (3 Credits)
A sociocritical approach to understanding modern French society through the study of print and non-print media documents (autobiography, film, and paraliterature), with reference to the Francophone world. Taught in French.
Prerequisite: FREN387; or permission of ARHU-French & Italian Languages & Literatures department.
Recommended: FREN473.

FREN478 Themes and Movements of French Literature in Translation (3 Credits)
Studies treatments of thematic problems or literary or historical movements in French literature. Topic to be determined each semester. Taught in English.

FREN479 Masterworks of French Literature in Translation (3 Credits)
Treats the works of one or more major French writers. Topic to be determined each semester. Taught in English.

FREN480 French Cinema: A Cultural Approach (in Translation) (3 Credits)
A study of French culture, civilization, and literature through the medium of film. Taught in English.Cross-listed with: CINE420.
Credit Only Granted for: FREN480, CINE420 or FILM420.
Formerly: FILM420.

FREN482 Gender and Ethnicity in Modern French Literature (3 Credits)
Literature by women writers of France and other French speaking areas with a focus on the relationship between gender, ethnicity and writing. Taught in English.

FREN488 Special Topics in Francophone Studies (3 Credits)
Topic and language of instruction to be announced when offered.
Repeatable to: 9 credits if content differs.

FREN489 Seminar in Themes or Movements of French Literature (3 Credits)
Seminar on selected themes or movements of French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN495 Honors Thesis Research (3 Credits)
The writing of a paper under the direction of a professor in this department and an oral examination. Required to fulfill the departmental honors requirement.
Restriction: Must be admitted to the departmental honors program.

FREN498 Special Topics in French Literature (3 Credits)
Selected topics in French literature.
Prerequisite: FREN387; and (FREN351 or FREN352). Or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN499 Special Topics in French Studies (3 Credits)
An aspect of French studies, the specific topic to be announced each time the course is offered.
Prerequisite: FREN387; or permission of ARHU-French & Italian Languages & Literatures department.
Repeatable to: 6 credits if content differs.

FREN600 Literary History, Theories, and Methodologies for French and Francophone studies (3 Credits)
Review of major movements in French and Francophone literature and introduction to theories and methods used in the field. Readings, discussions, and coursework in both French and English

FREN601 The History of the French Language (3 Credits)

FREN609 Special Topic in the French Language (3 Credits)

FREN611 The Structure of the French Language (3 Credits)
Phonology, morphology, syntax and semantics of modern French. Collection and critical analysis of language data.

FREN619 Special Topic in Medieval French Literature (3 Credits)

FREN629 Special Topic in Sixteenth Century French Literature (3 Credits)

FREN639 Special Topic in Seventeenth Century French Literature (3 Credits)

FREN649 Special Topic in Eighteenth Century French Literature (3 Credits)

FREN659 Special Topic in Nineteenth Century French Literature (3 Credits)

FREN665 Contemporary French Theater (3 Credits)
Examines selected plays from French contemporary theater (20th-21st c.) with a particular focus on new trends in writing, performing, and staging as they reflect the crisis faced by playwrights in particular, and French society in general at the aesthetic, social, and political levels. Students will explore different approaches to the analysis of theater plays and familiarize themselves with the evolution of mise-en-scene throughout the 20th century until the present day.

FREN669 Special Topics in Twentieth Century French Literature (3 Credits)

FREN679 The History of Ideas of France (3 Credits)
Analysis of currents of ideas as reflected in different periods and authors of French literature.

FREN689 Seminar in a Great Literary Figure (3 Credits)

FREN699 Seminar (3 Credits)
Topic to be determined each semester.

FREN709 College Teaching of French (1 Credit)
Introduction to the teaching of French at the college level with particular emphasis on methodology. Seminars in theory, demonstration of different teaching techniques, supervised practice teaching, training in language laboratory procedures, evaluation of instructional materials. Required of all graduate assistants in French.
Repeatable to: 2 credits.

FREN798 Master's Independent Study (1-3 Credits)
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 3 credits.

FREN799 Master's Thesis Research (1-6 Credits)

FREN818 French Literary Criticism (3 Credits)
Analysis and evaluation of various trends in literary criticism. Topic to be determined each semester.

FREN889 Doctoral Independent Study (3 Credits)
Repeatable to: 6 credits.

FREN898 Pre-Candidacy Research (1-8 Credits)
Repeatable to: 6 credits.

FREN899 Doctoral Dissertation Research (1-8 Credits)

GEOG - Geographical Sciences

GEOG413 Migration: Latin America and the United States (3 Credits)
Develops an understanding of the push and pull factors that have contributed to human mobility (migration) that has transformed the Americas. The class is divided in two parts: immigration and emigration from Latin American and Latin America migration to the United States. We will be interested in studying the migration shifts that have occurred in Latin America and the theories that help explain them. The themes that will be addressed are the history of migration with Latin America and to North America, the impact of this migration on both sending and receiving countries, and the various policy strategies and issues concerning migration.
Prerequisite: GEOG313; or permission of BSOS-Geography department.
Recommended: HIST250; or USLT201; or LASC234.
Credit Only Granted for: GEOG413, or GEOG498M.
Formerly: GEOG498M.

GEOG415 Land Use, Climate Change, and Sustainability (3 Credits)
The issues of climate change and land use change as two interlinked global and regional environmental issues and their implications for society and resource use are explored.
Prerequisite: GEOG123 or GEOG306; or permission of BSOS-Geography department.
Recommended: GEOG340; or GEOG342; or GEOG331. Or GEOG201; and GEOG211.
Credit Only Granted for: GEOG415 or GEOG498D.
Formerly: GEOG498D.

GEOG416 Conceptualizing and Modeling Human-Environmental Interactions (3 Credits)
Develops skills to carry out research that integrates environmental and economic aspects of sustainability by introducing extensively used quantitative tools for analyzing human-environmental interactions in the field of ecological economics. These include, e.g., index number calculations and decomposition analysis, Environmental Kuznets Curve (EKC), environmental input-output analysis and life-cycle analysis, and multi-criteria decisions aid (MCDA). Students will need laptops to run models during class.
Prerequisite: Permission of BSOS-Geography department.
Corequisite: MATH130, MATH140, or MATH120; or MATH220.

GEOG417 Land Cover Characterization Using Multi-Spectral Remotely Sensed Data Sets (3 Credits)
Students will be introduced to the image processing steps required for characterizing land cover extent and change. Key components of land cover characterization, including image interpretation, algorithm implementation, feature space selection, thematic output definition, and scripting will be discussed and implemented.
Prerequisite: GEOG272 and GEOG306; or permission of BSOS-Geography department. Jointly offered with: GEOG617.

GEOG418 Field and Laboratory Techniques in Environmental Science (1-3 Credits)
Lecture and laboratory learning each week. A variable credit course that introduces field and laboratory analyses in environmental science. Individual learning contract are developed with instructor.
Restriction: Permission of BSOS-Geography department.
Credit Only Granted for: GEOG418 or GEOG448.
Formerly: GEOG448.

GEOG421 Changing Geographies of China (3 Credits)
Covers physical geography, history, and economic and political systems of the world's most populous country. The major focus will be on geographical issues in China's contemporary development: agriculture, population, urbanization, resource and energy, and environment.
Prerequisite: Permission of BSOS-Geography department. Or GEOG202; and GEOG201; and (GEOG435, GEOG333, or GEOG332).
Recommended: GEOG130; or GEOG140.
Credit Only Granted for: GEOG328B or GEOG421.
Formerly: GEOG328B.

GEOG422 Changing Geographies of Sub-Saharan Africa (3 Credits)
Students will develop an understanding of the geographic contexts of SubSaharan Africa, including an overview of the physical, bioclimatic, historical, cultural, political, demographic, health and economic geographies of Sub-Saharan Africa. Students will fill in the map of Africa by studying the spatial distribution within each of these geographic domains. In addition to an overview of geography South of the Sahara, the Congo will be taken as a more intensive case study through additional readings, lectures and discussions.
Prerequisite: Permission of BSOS-Geography department. Or GEOG201; and GEOG202; and (GEOG335 or GEOG333).
Recommended: GEOG130 or GEOG110.
Credit Only Granted for: GEOG328C, GEOG422.
Formerly: GEOG328C.

GEOG423 Latin America (3 Credits)
A geography of Latin America and the Caribbean in the contemporary world: political and cultural regions, population and natural resource distribution, economic and social development, poverty, crime, urbanization, migration trends, and natural disasters.
Prerequisite: Permission of BSOS-Geography department. Or GEOG201 and GEOG202; and (GEOG332, GEOG435, or GEOG333).
Recommended: GEOG130 and GEOG110.
Credit Only Granted for: GEOG313 or GEOG423.
Formerly: GEOG313.

GEOG431 Culture and Natural Resource Management (3 Credits)
Basic issues concerning the natural history of humans from the perspective of the geographer. Basic components of selected behavioral and natural systems, their evolution and adaptation, and survival strategies.
Credit Only Granted for: GEOG421 or GEOG431.
Formerly: GEOG421.

GEOG432 Spatial Econometrics (3 Credits)
An introduction to modern econometric techniques in general and spatial econometrics in particular, using the popular open source statistical computer language R. A focus on using statistical computing to produce analytical reports for real-world applications, research papers, and dissertations.
Prerequisite: Permission of BSOS-Geography department. Or GEOG201; and GEOG202; and GEOG306; and GEOG332. Jointly offered with GEOG732. Credi t only granted for: GEOG498E, GEOG432, GEOG788E, GEOG732.
Formerly: GEOG498E.

GEOG433 Land Use and Urban Economics (3 Credits)
While populations in developed countries have already concentrated in cities, recent estimates suggest that there will be several billion new urban dwellers mainly in developing countries during the first three decades of this century. This class will equip you to answer the following questions by introducing space into economic models and studying the location of economic activities: Why are cities so attractive to majority of population and industrial/commercial activities? What determines the land-use intensity and patterns of a city? Which policies can modify the shape of a city?
Prerequisite: Permission of BSOS-Geography department. Or GEOG201 and GEOG202; and (GEOG333 or GEOG332).

GEOG437 Political Geography (3 Credits)
Geographical factors in the national power and international relations; an analysis of the role of geopolitics and geostrategy, with special reference to the current world scene.
Credit Only Granted for: GEOG423 or GEOG437.
Formerly: GEOG423.

GEOG438 Seminar in Human Geography (3 Credits)
Selected topics in human geography.
Recommended: GEOG201; or GEOG211.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG441 The Coastal Ocean (3 Credits)
Introduction to coastal oceanography, focusing on the physical, biological, and geological aspects of ocean areqs on the inner continental shelves. Wave, currents, and tidal dynamics of bays, open coast, estuaries, and deltas. Sedimentary environments of major coastal types. Ecology and biogeochemical relationships, including benthic and planktonic characteristics. Coastal evolution with sea level rise. Human impacts: eutrophication, modification of sedimentation. The coastal future: rising sea level, hypoxia, and increased storminess.
Prerequisite: GEOG140; or students who have taken courses with comparable content may contact the department; or permission of BSOS-Geography department.
Credit Only Granted for: GEOG441 or GEOG498C.
Formerly: GEOG498C.

GEOG442 Biogeography and Environmental Change (3 Credits)
Biogeographical topics of global significance, including a consideration of measurement techniques, and both descriptive and mechanistic modeling. Topics may include: scale in biogeography, biodiversity, carbon geography, climate and vegetation, interannual variability in the biosphere, land cover, global biospheric responses to climate change, NASA's Mission to Planet Earth and Earth Observation System. The class focuses on both natural and athropogenic controls, impacts of biography on climate and ecosystem services and different methods in biogeography.
Prerequisite: GEOG301. And GEOG201 and GEOG211; or permission of BSOS-Geography department. Jointly offered with GEOG642.
Credit Only Granted for: GEOG642, GEOG442, GEOG447, or GEOG484.
Formerly: GEOG4 47.

GEOG458 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

GEOG461 Machine Learning for Computational Earth Observation Science (CEOS) (3 Credits)
Provides an introduction to machine learning methods and models with an emphasis on Earth observation. Topics will include supervised (decision trees, random forest, neural networks, support vector machine, Gaussian process and ensemble techniques), and unsupervised techniques (clustering/segmentation, dimension reduction, multi-dimensional data visualization). The course will highlight the state-of-the-art deep learning models; object-based versus pixel-based image classification; how to deal with missing data and non-uniform coverage of data; and large scale land cover land use mapping from heterogenous satellite data. Practical part will include satellite image classification by applying classification models and biophysical parameters retrieval by applying regression models.
Prerequisite: GEOG371.

GEOG470 Spatial Data Algorithms (3 Credits)
Geometric primitives and algorithms for discrete and continuous spatial data processing. Point data representation and analysis: spatial data structures, neighbor finding and range queries, clustering algorithms. Terrain modeling: grids and TINs, algorithms and data structures for building and querying TINs, gridding and interpolation. Terrain analysis: segmentation through watershed computation, algorithms for visibility computation. Applications to LiDAR data processing and analysis for forest management, urban modeling, and coastal data mapping.
Prerequisite: GEOG276 or permission of instructor. Jointly offered with: GEOG770.
Credit Only Granted for: CMSC498Q, CMSC788I, GEOG470, GEOG498I, GEOG770, or GEOG788I.
Formerly: GEOG498I.

GEOG472 Remote Sensing: Digital Processing and Analysis (3 Credits)
Digital image processing and analysis applied to satellite and aircraft land remote sensing data. Consideration is given to image preprocessing techniques including radiometric calibration, geometric registration as well as atmospheric correction. Analysis methods include digital image exploration, feature extraction, thematic classification, change detection, and biophysical characterization. An application-oriented course project will be completed through the self-guided computer labs.
Prerequisite: GEOG272 and GEOG306; or students who have taken courses with comparable content may contact the department.

GEOG473 Geographic Information Systems and Spatial Analysis (3 Credits)
Analytical uses of geographic information systems; data models for building geographic data bases; types of geographic data and spatial problems; practical experience using advanced software for thematic domains such as terrain analysis, land suitability modeling, demographic analysis, and transportation studies.
Prerequisite: GEOG306 and GEOG373; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: GEOG473 or GEOG482.
Formerly: GEOG482.

GEOG475 Computer Cartography (3 Credits)
An overview of the basic concepts and techniques that underlie digital map making and the broader field of geographic visualization for intermediate GIS users. This includes the use of color, map symbolization, map layout, and also the contribution to geographic visualization from the fields of scientific visualization, information visualization, and cognition. Fundamentals of dynamic map design and web mapping will be introduced through the use of animated and interactive maps.
Prerequisite: GEOG373 and GEOG306.
Credit Only Granted for: GEOG471 or GEOG475.
Formerly: GEOG471.

GEOG476 Object-Oriented Computer Programming for GIS (3 Credits)
Expands on conceptual and practical aspects of programming for geographic applications. The main focus of this course is to provide students more advanced programming in object oriented programming languages (i.e. Python). In addition, students will develop a proficiency in applying these advanced programming principles to manipulating spatial data sources within the Geographic Information Systems (GIS).
Prerequisite: GEOG373 and GEOG376; or permission of BSOS-Geography department. And must have completed MATH220; or must have completed or be concurrently enrolled in MATH120, MATH130, or MATH140.
Restriction: Must be in Geography program; or must be in GIS minor.

GEOG477 Mobile GIS Development (3 Credits)
Designed as an introduction to mobile GIS, to the programming concepts underlying mobile GIS development, and more importantly, to the design and implement of a mobile GIS application. Covers how to develop, test, and publish mobile GIS native apps working across two mobile platforms: Android and iOS. This course will also try to leverage the capabilities of JavaScript, Swift, Google maps, ArcGIS Server and runtime SDK to developing and publishing mobile GIS web apps.
Prerequisite: GEOG306, GEOG373, and GEOG376; and (GEOG473, GEOG475, or GEOG476). And MATH140 or MATH120; or must have completed MATH220.
Restriction: Must be in a major within the BSOS-Geography department; or permission of BSOS-Geography department.
Credit Only Granted for: Geog477 or Geog498V.
Formerly: Geog498V.

GEOG498 Topical Investigations (1-3 Credits)
Independent study under individual guidance.
Prerequisite: Restricted to advanced undergraduate students; and 24 credits in GEOG courses. Or restricted to graduate students.
Repeatable to: 6 credits if content differs.

GEOG601 The Nature and Practice of Science (3 Credits)
Introduces students to the nature and practice of science in physical and human geography, including practical methods for research productivity, professional, societal and ethical obligations of scientists, the philosophy of science, and the scientific literature. Students will prepare and critically evaluate research proposals.
Restriction: Permission of BSOS-Geography department.
Credit Only Granted for: GEOG601 or GEOG788N.
Formerly: GEOG788N.

GEOG603 Masters Research Tutorial (3 Credits)
Development of Masters scholarly paper topic, critical literature review, formulation of geographical approach to research methodology. Individual meetings with faculty. Comprehensive exam before the end of the semester.
Prerequisite: GEOG600.
Restriction: Permission of BSOS-Geography department.
Credit Only Granted for: GEOG603 or GEOG610.
Formerly: GEOG610.

GEOG606 Quantitative Spatial Analysis (3 Credits)
Multivariate statistical method applications to spatial problems. Linear and non-linear correlation and regression, factor analysis, cluster analysis. Spatial statistics including: trend surfaces, sequences, point distributions. Applications orientation.
Prerequisite: GEOG305; or permission of BSOS-Geography department.
Credit Only Granted for: GEOG605 or GEOG606.
Formerly: GEOG605.

GEOG608 Comprehensive Portfolio Assessment Summary (1-3 Credits)
Evaluation of a PhD student's portfolio.
Repeatable to: 3 credits.

GEOG609 Seminar in Remote Sensing (3 Credits)
Topics in Remote Sensing: These may include agricultural, forestry, coastal environments, urban environments, and other major applications of remote sensing. Also may focus on new and existing earth observation missions dedicated to land research.
Prerequisite: GEOG480.
Repeatable to: 6 credits if content differs.

GEOG614 Human Dimensions of Global Change (3 Credits)
The intersection of human and biophysical systems from the vantage point of the impact of human actions on the environment are examined. The impact of the biophysical environment on humans is also discussed.

GEOG615 Land Cover and Land Use Change (3 Credits)
This class provides an examination of land cover and land use change science, addressing the causes, impacts and projection of change. Key concepts of land use science are presented and recent research papers and case studies are reviewed. Class consists of lectures, invited presentations and individual student projects and presentations.
Prerequisite: GEOG442, GEOG472, GEOG435, or GEOG473; or permission of BSOS-Geography department.

GEOG617 Land Cover Characterization Using Multi-Spectral Remotely Sensed Data Sets (3 Credits)
Students will be introduced to the image processing steps required for characterizing land cover extent and change. Key components of land cover characterization, including image interpretation, algorithm implementation, feature space selection, thematic output definition, and scripting will be discussed and implemented.
Prerequisite: Permission of BSOS-Geography department. Or GEOG372; and GEOG472; and GEOG306. Jointly offered with GEOG417. Credit only grante d for: GEOG498R, GEOG788R, GEOG417, or GEOG617.
Formerly: GEOG788R.

GEOG618 Seminar in Geomorphology (3 Credits)
Selected topics; this can include discussion of empirical and theoretical research methods applied to geomorphological problems including review of pertinent literature.

GEOG628 Seminar in Climatology (3 Credits)
Selected topics in climatology chosen to fit the individual needs of advanced students.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG630 Climate, Energy, and Policy (3 Credits)
Students will learn about climate change and energy policy from multiple perspectives including social economic, technological, scientific, and behavioural aspects and their interdependence. The course will also consider the report of the Intergovernmental Panel on Climate Change on mitigation and applied cost/benefit analysis of Climate Change.
Prerequisite: Permission of BSOS-Geography department; or enrolled in the Geographical Sciences Graduate Program(s).
Credit Only Granted for: GEOG430, GEOG630, or GEOG788E.
Formerly: GEOG788E.
Additional Information: This course will make occasional use of the popular open source statistical computer language R for practical workshops.

GEOG632 Economic Geography (3 Credits)
An advanced graduate level introduction to the effects of geography on economic activities and the effects of economic incentives, institutions, and activities on the nature and sustainability of human and environmental geographic systems.
Restriction: Permission of BSOS-Geography department.

GEOG636 Qualitative Methods in Geography (3 Credits)
Use of qualitative methods for qualitative geographic research. Design procedures and analysis of qualitative studies are the focus of the course. Includes readings and trying out various methods. Students will be able to present their own research and use it as an example throughout the course.
Restriction: Permission of BSOS-Geography department.
Formerly: GEOG648C.

GEOG638 Seminar in Biogeography (3 Credits)
Topics in Biogeography: Biological aspects of Geography. These may include ecology, biodiversity, climate-vegetation interactions, impacts of global change.
Prerequisite: Must have completed 6 credits of biogeography or ecology; or students who have taken courses with comparable content may contact the department.
Repeatable to: 6 credits if content differs.

GEOG639 Seminar in Physical Geography (3 Credits)
Examination of selected themes and problems in physical geography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG642 Biogeography and Environmental Change (3 Credits)
Biogeographical topics of global significance, including a consideration of measurement techniques, and both descriptive and mechanistic modeling. Topics may include: scale in biogeography, biodiversity, carbon geography, climate and vegetation, interannual variability in the biosphere, land cover, global biospheric responses to climate change, NASA's Mission to Planet Earth and Earth Observation System. The class focuses on both natural and athropogenic controls, impacts of biography on climate and ecosystem services and different methods in biogeography.
Restriction: Permission of BSOS-Geography department. Jointly offered w ith GEOG442.
Credit Only Granted for: GEOG788C, GEOG642, or GEOG442.
Formerly: GEOG788C.

GEOG646 Programming for GIS (3 Credits)
An introduction to computer programming using Python and web programming languages. It is required for students in the MSGIS program before they enroll in more advanced programming courses (GEOG656 and GEOG657). This course teaches students the fundamentals concepts of computer science. Students will learn about the components of a computer program such as data management, conditional statements, iterative statements, and file processing. Students will develop programs and web apps for the purpose of automating tasks and assisting with data analysis.
Additional Information: This class is recommended for all MSGIS students who have no prior computer programming background as well as those who wish to have additional practice. The skills learned in this class will be useful for more advanced courses such as GEOG656 (Programming and Scripting for GIS), GEOG657 (Web Programming), and GEOG650 (Mobile GIS).

GEOG648 Seminar in Cultural Geography (3 Credits)
Examination of selected themes and problems in cultural geography.
Repeatable to: 6 credits if content differs.

GEOG650 MOBILE GIS (3 Credits)
This course covers how to create, test, and publish mobile GIS applications that work across multiple platforms (Android, iOS, and Black Berry Tablet OS) and adapt to a smartphone or tablet display.
Prerequisite: GEOG657.
Restriction: Must be in Geospatial Information Sciences (Master's) program; or must be in Graduate Certificate: Professional Studies-Geospatial Information Sciences.

GEOG651 Spatial Statistics (3 Credits)
This course is about quantitative analysis of spatial data. It is intended to provide a broad survey of various methods of exploratory statistical data analysis most useful in environmental and social sciences. The course is a mix of theory, methods, and applications geared towards helping students: (1) develop an understanding of the important theoretical concepts in spatial data analysis; and (2) gain practical experience in application of spatial statistics to a variety of social and environmental problems using advanced statistical software.
Prerequisite: GEOG615; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in Geospatial Information Sciences (Master's) program; or must be in Graduate Certificate: Professional Studies-Geospatial Information Sciences.

GEOG652 Digital Image Processing and Analysis (3 Credits)
Digital image processing and analysis applied to satellite and aircraft land remote sensing data. Consideration is given to preprocessing steps including calibration and geo registration. Analysis methods include digital image exploration, feature extraction thematic classification, change detection, and biophysical characterization. One or more application examples may be reviewed.
Prerequisite: GEOG579; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in Geospatial Information Sciences (Master's) program; or must be in the Geospatial Information Sciences (Graduate Certificate) program.

GEOG653 Spatial Analysis (3 Credits)
Methods of spatial analysis including measuring aspects of geometric features and identifying spatial patterns of geospatial objects that are represented as point, line, network, areal data, and 3-D surfaces.
Prerequisite: GEOG579; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in Geospatial Information Sciences (Master's) program; or must be in the Geospatial Information Sciences (Graduate Certificate) program.

GEOG654 GIS and Spatial Modeling (3 Credits)
Provide foundations and understanding on various issues related to modeling and simulation in GIS context. It will addresses the concepts, tools, and techniques of GIS modeling, and presents modeling concepts and theory as well as provides opportunities for hands-on model design, construction, and application. The focus will be on raster-based modeling. This course is also application-orientated, particularly in these fields such as terrain modeling, LULC modeling, hydrological modeling, suitability modeling, etc.
Prerequisite: GEOG653.
Restriction: Must be in Geospatial Information Sciences (Master's) program; or must be in Graduate Certificate: Professional Studies-Geospatial Information Sciences.

GEOG655 Spatial Database System (3 Credits)
This course is designed to help students understand, analyze, design, and implement spatial databases. While the basic concepts and theories of database will be introduced, the focus of this course will be on providing students with hands-on experiences to practice the technical skills used in spatial database design and implementation. SQL, Oracle, and ArcSDE are the key topics.
Prerequisite: GEOG653.
Restriction: Must be in Geospatial Information Sciences (Master's) program; or must be in Graduate Certificate: Professional Studies-Geospatial Information Sciences.

GEOG656 Advanced Programming for GIS (3 Credits)
Programming and scripting for intermediate GIS users. The fundamental concepts of computer programming will be introduced within the Geoprocessing framework in ArcGIS primarily using Python. Concepts of object-oriented programming and scripting will be presented. Students will develop skills in programming techniques to explore, manipulate and model spatial data using the Geoprocessor methods.
Prerequisite: GEOG653.
Restriction: Must be in Geospatial Information Sciences (Master's) program; or must be in Graduate Certificate: Professional Studies-Geospatial Information Sciences.

GEOG657 Web Programming (3 Credits)
Intermediate course designed to teach students the techniques for Web development, particularly creating dynamic and data-driven Web applications. Introduces a high-level, object-oriented programming language such as VB.Net and the designing, coding, debugging, testing, and documenting for the development of Web-based applications. Other popular Web development tools such as DHTML, CSS and PHP are also covered.
Prerequisite: GEOG653.
Restriction: Must be in Geospatial Information Sciences (Master's) program; or must be in Graduate Certificate: Geospatial Information Sciences program.
Credit Only Granted for: GEOG657 or GEOG788R.
Formerly: GEOG788R.

GEOG658 Seminar in Historical Geography (3 Credits)
An examination of themes and problems in historical geography with reference to selected areas.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG660 Advanced Remote Sensing Using Lidar (3 Credits)
Lidar, also known as laser scanning, is an active remote sensing tool that can produce high-resolution point clouds. Lidar is being applied to problems such as terrain modeling, biomass estimation, change detection, feature extraction, and measuring tree canopy. Topics covered are fundamentals of lidar, current developments in lidar technology, and different applications where lidar is being used. Students will get hands-on learning about lidar data management, processing, and analysis.
Prerequisite: GEOG652.
Recommended: GEOG656 and GEOG654.
Credit Only Granted for: GEOG660 or GEOG788G.
Formerly: GEOG788G.

GEOG661 Fundamentals of Geospatial Intelligence (3 Credits)
Geospatial Intelligence (GEOINT) is the collection, analysis, visualization and dissemination of geospatial information to support decision-making. This course introduces the fundamental knowledge required to become a successful GEOINT practitioner, including the history of the GEOINT discipline, the intelligence applications of remote sensing and Geographic Information Systems (GIS) technologies, and how GEOINT products are used to support national security and humanitarian missions. Upon completion of this course you will understand the roles that technology, policy, doctrine, government, and industry play in shaping the Geospatial Intelligence discipline, and develop the technical knowledge and domain expertise to create basic GEOINT products that provide context for decision makers.

GEOG662 Advances in GIS and Remote Sensing (3 Credits)
Focuses on state-of-the-art advances in geographic information science and remote sensing as they support geospatial intelligence. Focus on synergies between GIS and remote sensing in informatics, computer science, and spatial engineering, and their application to problem domains in human systems, physical systems, and cyberspace. Advances in GIS presents recent advances regarding fundamental issues of geo-spatial information science (space and time, spatial analysis, uncertainty modeling and geo-visualization), and new scientific and technological research initiatives for geo-spatial information science (such as spatial data mining, mobile data modeling, and location-based services). Advances in remote sensing will provide opportunity to understand and work with latest developments in the Remote Sensing datasets. The curriculum covers wide range of remote sensing data interpretation and their processing techniques.
Restriction: Students taking the course must be familiar with data structures, basic GIS and RS concepts, and demonstrate basic understanding of using GIS and RS software. And must be enrolled in Geographical Sciences MPS or graduate certificate program; or permission of BSOS-Geography department.

GEOG663 Big Data Analytics (3 Credits)
Designed to introduce statistical analysis over big data sets (and tackling big data problems), primarily in geography and spatial sciences, but with broader appeal throughout the socio-behavioral sciences. Students will be introduced to a range of methods that can be applied to the exploration, modeling, and visualization of big quantitative data. This course explores data fusion, statistical analysis, and data-mining for geospatial and non-geospatial data in structured and unstructured form, with an emphasis on large silos of data across diverse sources and assumptions. Topics will include open sourcing, metadata schemes, data standards and models, data-access, data-mining, clustering methods, classifiers, data reduction, machine learning, filtering schemes, real-time and streaming data, archiving and preservation, and handling uncertainty.
Recommended: Students taking the course must be familiar with data structures, basic GIS and RS concepts, and demonstrate basic understanding of using GIS and RS software.
Restriction: Permission of BSOS-Geography department; or must be enrolled in Geographical Sciences MPS or graduate certificate program.

GEOG664 GEOINT Systems and Platforms (3 Credits)
There are numerous systems and platforms that support the collection, visualization and dissemination of Geospatial Intelligence (GEOINT). Platforms such as satellites and aircraft carry sensors systems that can detect both physical and man-made objects on the earth. Ground-based processing systems are used to analyze and visualize sensor data, and also to create and disseminate GEOINT products that guide decision-making. In this course you will learn how to develop and implement source-to-screen GEOINT workflows, and will understand how to use a system of systems approach to describe the programmatic and technical strengths and weaknesses of many different GEOINT systems and platforms.

GEOG665 Algorithms for Geospatial Intelligence Analysis (3 Credits)
Exposes students to fundamental algorithms in geospatial intelligence and their application in methodological and substantive domains, and their implementation in computer programs and software systems. Current topics include spatial and space-time analysis, cartographic transformations, data compression and reduction, MapReduce and distributed data access, genetic algorithms, clustering and indexing algorithms, filtering algorithms, geometry and tessellation algorithms, routing algorithms, localization algorithms, and complexity and scaling. Implementation of algorithms will be explored through pseudo-code and a variety of scripting, data access, and programming languages.
Recommended: Students taking the course must be familiar with data structures, basic GIS and RS concepts, and demonstrate basic understanding of using GIS and RS software.
Restriction: Permission of BSOS-Geography department; or must be enrolled in Geographical Sciences MPS or graduate certificate program.

GEOG666 Drones for Data Collection (3 Credits)
Topics covered in this class include: how to prepare students to obtain their FAA Remote Pilot License, understand how to pick drone systems for a data need, and utilize Pix4D to process drone imagery. Before talking about data students will learn about drone and aviation specific laws that will affect them while carrying out operations. Once legal limitations of drone flights have been covered the course will shift toward learning how to select a drone system based on specifications of the equipment and needs of the project and flying. Students will then move on to data processing utilizing Pix4D, Python, and Bash to clean data and automate processing.
Prerequisite: GEOG646 or GEOG656.
Restriction: Must be in Geospatial Information Sciences (Master's) program; or must be in Graduate Certificate: Professional Studies-Geospatial Information Sciences.
Credit Only Granted for: GEOG688E or GEOG666.
Formerly: GEOG688E.

GEOG668 Seminar in Economic Geography (3 Credits)
Examination of themes and problems in the field of economic geography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG670 Open Source GIS (3 Credits)
An exploration of techniques for using Free and Open Source Software for GIS (FOSS4g) from conception to final presentation of results. Advanced concepts and techniques including enterprise GIS, spatial SQL, parallel processing, and displaying the results of GIS analysis over the Internet will also be covered.
Credit Only Granted for: GEOG670 or GEOG788A.
Formerly: GEOG788A.
Additional Information: Students do not need any experience using open source GIS, but students are expected to be comfortable using a desktop GIS such as ArcGIS.

GEOG671 Remote Sensing Instruments and Observtions (3 Credits)
Detailed examination of land remote sensing instruments, observatories and resultant measurements in the optical portion of the EM spectrum. Includes computer-based exercises that examine the importance of data geo-registration and radiometric calibration in land measurements.
Prerequisite: GEOG472; or students who have taken courses with comparable content may contact the department; or permission of BSOS-Geography department.

GEOG672 Biophysics of Optical Remote Sensing (3 Credits)
Biophysical principles, phenomena and processes underlying multispectral remote sensing in the optical portion of the EM spectrum. Includes computer-based exercises that explore the biophysical basis of land patterns and dynamics observed in remote sensing data.
Prerequisite: GEOG472; or students who have taken courses with comparable content may contact the department; or permission of BSOS-Geography department.

GEOG673 GIS Modeling (3 Credits)
Process modeling and spatial analysis within the GIS context. Introducestheoretical fundamentals and conceptual approaches to frame and represent geographical phenomena and spatial decision making.
Prerequisite: GEOG306 and GEOG473; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: GEOG673 or GEOG695.
Formerly: GEOG695.

GEOG674 GIS Spatial Databases (3 Credits)
Introduces fundamental concepts and practical skills required to design, implement and use GIS databases. Students will learn to store and represent geospatial data in databases, design and create a spatial database, manage and query geospatial data, and deliver and present geospatial data.
Prerequisite: GEOG473; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: GEOG674 or GEOG696.
Formerly: GEOG696.

GEOG676 Advanced Programming for Geography and Remote Sensing (3 Credits)
Comprehensive instruction is provided in the advanced use of a commercial programming language and analysis tool used for scientific programming and data visualization, with an emphasis on applications in geography and remote sensing or GIS.
Prerequisite: GEOG376; or permission of BSOS-Geography department.

GEOG677 Web GIS (3 Credits)
This course is designed to: (1) introduce the concepts and theories that are related to an increasingly important technology b (2) introduce various technologies or techniques for creating, analyzing, and disseminating GIS data and services via the Web. Students will be required to practice almost all of the Web GIS tools including client side mapping frameworks like the ArcGIS API for JavaScript, Mapbox, Leaflet, Google Map API, OpenLayers; server side systems including ArcGIS Enterprise (Server/Portal/DataStore), GeoServer; data formats for the web WMS, WFS, Feature Services, MapServices. Students will also be exposed to the experience of working with the Cloud environment such as AWS EC2 and Azure.
Recommended: GEOG676.
Restriction: Permission of BSOS-Geography department.

GEOG679 Seminar in Urban Geography (3 Credits)
Post-industrial urbanization; urban planning and management; metropolitan systems; internal structure of the city; use of techniques in urban locational research; transportation and land use.
Repeatable to: 6 credits if content differs.

GEOG680 GEOINT Networks (3 Credits)
Networks are an important part of the Geospatial Intelligence (GEOINT) cycle, from the sensor networks that are used to collect raw geospatial information to the telecommunication networks that are used to disseminate finished GEOINT products. Transportation networks, computer networks, social networks, and many other man-made and natural features can also be characterized by a link-node network topology, and can be studied using network science methods. Upon completion of this course you will be able characterize and classify real-world GEOINT networks and their components, understand network dynamics including routing, scalability, and robustness, and be able to apply engineering methods for network design and network analysis.

GEOG681 Introduction to Computational Social Science (3 Credits)
Introduction to Computational Social Science serves as an introduction to the basis for computational social science (CSS) across diverse disciplines and topics at the intersection of the socio-behavioral sciences, physical sciences, and computing sciences. We will explore the foundations for CSS in different subject domains, as the methods used to build representations of social science entities, phenomena, and processes in computational media. We will also critique applied computational social science as it relates to topics that cut across the socio-behavioral sciences, or that specialize within particular socio-behavioral science domains.
Credit Only Granted for: GEOG681 or GEOG788W.
Formerly: GEOG788W.

GEOG682 Open Source Intelligence (3 Credits)
Open Source Intelligence (OSINT) is information that is publicly available that is collected and analyzed to support decision-making. The collection and analysis of OSINT is often considered to be the first step in developing an all-source intelligence product, where OSINT is fused with Geospatial Intelligence (GEOINT), Signals Intelligence (SIGINT), and Measurement and Signature Intelligence (MASINT), and Human Intelligence (HUMINT). In this course you will learn about the sources, ethics, and methods that are associated with OSINT, and will also develop knowledge and skills related to open-source geospatial technologies and organizations such as the Open Geospatial Consortium (OGC).

GEOG683 Hazards and Emergency Management (3 Credits)
Timely and accurate Geospatial Intelligence (GEOINT) is essential for protecting people from hazardous events such as floods, wildfires, tsunamis, hurricanes, industrial accidents, and terrorist attacks. GEOINT plays a critical role in all four stages of emergency management: preparedness, mitigation, response, and recovery. The use of remote sensing and Geographic Information Systems (GIS) before, during, and after Hurricane Katrina and the 9/11 terror attacks are two of the case studies that are discussed during this course. You will develop a deeper understanding of the emergency management successes and failures that occurred during these historic and deadly events, and learn the technical skills to develop and disseminate GEOINT products that support decision-making at all four stages of emergency management.

GEOG686 Mobile GIS and Geocomputing (3 Credits)
An introduction to mobile GIS, to the programming concepts underlying mobile GIS development, and to the design and implementation of a mobile GIS application. Covers how to develop, test, and publish mobile GIS native apps working across two mobile platforms: Android and iOS. Leverages the capabilities of JavaScript, Swift, Google maps, ArcGIS Server and runtime SDK to developing and publishing mobile GIS apps.
Prerequisite: Permission of BSOS-Geography department; or must be enrolled in Geographical Sciences MPS or graduate certificate program.
Recommended: Students taking the course must be familiar with data structures, basic GIS concepts, and demonstrate basic understanding of object-oriented programming under GIS environment.
Credit Only Granted for: GEOG477, GEOG498V, GEOG788V or GEOG777.
Additional Information: Tablets that run android and iOS will be loaned to registered students at no cost.

GEOG688 Selected Topics in GIS (1-3 Credits)
Readings and discussion on selected topics in the field of Geographic Information Science (GIS).
Repeatable to: 15 credits if content differs.

GEOG693 Independent Study in GEOINT (3 Credits)
In order to broaden the scope of the knowledge for our students in the ever-changing technologies in Geospatial Intelligence, the independent study course gives students an opportunity to explore a topic of interest under the close supervision of a faculty with expertise in the field. The course may include directed readings, applied work, assisting the faculty member with a research project, carrying out an independent research project, or other activities deemed appropriate by the supervising faculty member and the program.
Restriction: Permission of the Geospatial Intelligence program.

GEOG694 Computerized Map Projections and Transformations (3 Credits)
Computer generated projections; techniques for transforming one coordinate system to another; software for producing different map projections; mathematical and perceptual problems in producing and using projections.
Prerequisite: GEOG694; or students who have taken courses with comparable content may contact the department; or permission of BSOS-Geography department.

GEOG697 Capstone Project (3 Credits)
An independent research project that demonstrates competence in geospatial intelligence technologies. This project can originate from an internship, from relevant work at a current or past employer, or can be developed in conjunction with a department faculty. The student will prepare a project report and presentation which shall contain an executive summary, background information including a literature review and establishment of requirements, a detailed technical description of the project data and methods, a discussion of results obtained, and final conclusions and recommendations. The final project submission will include all data, computer code and/or workflow documentation required to replicate the project results. In completing this project, students develop a concrete example of how GEOINT technologies can be applied to solve real-world problems, and begin developing a portfolio that can be presented to potential employers.
Prerequisite: 24 credits in GEOG courses.
Restriction: Students taking the course must be familiar with data structures, basic GIS and RS concepts, and demonstrate basic understanding of using GIS and RS software. And must be enrolled in Geographical Sciences MPS or graduate certificate program; or permission of BSOS-Geography department.

GEOG698 Seminar in Cartography (1-6 Credits)
Selected topics; this can include: forensic cartography, tactile maps, design with new technologies, perception and cognitive mapping, history of cartography, laboratory management.
Repeatable to: 6 credits if content differs.

GEOG699 Seminar in Computer Cartography (3 Credits)
Selected topics in computer-assisted cartography: algorithms for linear generalization, containing three-dimensional mapping and continuous-time mapping.
Prerequisite: GEOG373; or students who have taken courses with comparable content may contact the department; or permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG718 Seminar in Integrative Studies (3 Credits)
Selected topics integrating various areas of study within the field of geography and/or related disciplines.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG732 Spatial Econometrics (3 Credits)
An introduction to modern econometric techniques in general and spatial econometrics in particular, using the popular open source statistical computer language R. A focus on using statistical computing to produce analytical reports for real-world applications, research papers, and dissertations.
Prerequisite: Permission of BSOS-Geography department. Or GEOG201; and GEOG306; and GEOG202; and GEOG332. Jointly offered with GEOG432. Credi t only granted for: GEOG498E, GEOG432, GEOG788E, GEOG732.
Formerly: GEOG498E, GEOG788E.

GEOG738 Seminar in Human Geography (3 Credits)
Selected topics in human geography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG748 Seminar in Physical Geography (3 Credits)
Selected topics in physical geography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG749 Seminar in Biogeography (3 Credits)
Selected topics in biogeography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG770 Algorithms for Geospatial Computing (3 Credits)
Geometric primitives and algorithms for discrete and continuous spatial data processing. Point data representation and analysis: spatial data structures, neighbor finding and range queries, clustering algorithms. Terrain modeling: grids and TINs, algorithms and data structures for building and querying TINs, gridding and interpolation. Terrain analysis: segmentation through watershed computation, algorithms for visibility computation. Applications to LiDAR data processing and analysis for forest management, urban modeling, and coastal data mapping.
Prerequisite: GEOG276 or permission of instructor. Jointly offered with: GEOG470.
Credit Only Granted for: CMSC498Q, CMSC788I, GEOG470, GEOG498I, GEOG770, or GEOG788I.
Formerly: GEOG788I.

GEOG777 Mobile GIS Development (3 Credits)
Designed as an introduction to mobile GIS, to the programming concepts underlying mobile GIS development, and more importantly, to the design and implementation of a mobile GIS application. Covers how to develop, test, and publish mobile GIS native apps working across two mobile platforms: Android and iOS. This course will also try to leverage the capabilities of JavaScript, Swift, Google maps, ArcGIS Server and runtime SDK to developing and publishing mobile GIS web apps.
Prerequisite: Permission of BSOS-Geography department; or must be enrolled in Geographical Sciences Phd or MS degree program.
Restriction: Must be in a major within the BSOS-Geography department; or permission of BSOS-Geography department.
Credit Only Granted for: GEOG477, GEOG498V, GEOG788V or GEOG777.
Formerly: GEOG788V.

GEOG778 Seminar in Remote Sensing (3 Credits)
Selected topics in remote sensing.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG779 Seminar in Geographic Information Science (3 Credits)
Selected topics in geographic information science.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 6 credits if content differs.

GEOG788 Selected Topics in Geography (1-3 Credits)
Readings and discussion on selected topics in the field of geography.
Restriction: Permission of BSOS-Geography department.
Repeatable to: 12 credits if content differs.

GEOG789 Independent Readings (1-3 Credits)
Independent reading as arranged between a graduate faculty member and graduate student.
Repeatable to: 6 credits if content differs.

GEOG790 Internship in Geography (3 Credits)
Field experience in the student's specialty in a Federal, state, or local agency or private business. Research paper required.

GEOG792 Teaching Assistant Seminar (1 Credit)
GEOG 792 - Guidance and instruction for incoming and future teaching assistants.

GEOG795 Professional Practices Seminar (1 Credit)
Development and preparation of a resume, selecting and helping reference writers, conducting successful interviews, negotiating an employment package, giving professional presentations, proposal prepartion, writing reports, codes of ethics and responsibilities. Presentations from practitioners in GIS field. Basic project management skills and strategies in preparation for professional project.
Restriction: Must be in Geospatial Information Sciences (Master's) program.

GEOG796 GIS Project Management (3 Credits)
Project management methodology is covered, emphasizing implementing and integrating GIS into broader projects. Topics include project initiation, planning, scope, scheduling, budgeting and risk management.
Prerequisite: GEOG653, GEOG652, and GEOG606.
Restriction: Must be in Geospatial Information Sciences (Master's) program; or must be in the Geospatial Information Sciences (Graduate Certificate) program.
Credit Only Granted for: GEOG796 or INFM706.
Formerly: INFM706.

GEOG797 Professional Project (3 Credits)
Data and materials can originate from an internship (internal or external) or from relevant work experience with current employer. Under direction of faculty advisor, students will prepare a project report containing explanation of the requirements for the work, technical account of the activities undertaken, including literature review, description of methods and approaches taken, a critical discussion of results, along with conclusions and recommendations developed from the project. Final project will consist of a full-fledged GIS application that is up and running and can be tested, providing potential employers with a portfolio demonstrating student's ability to manage and develop a GIS application in real world situations.
Prerequisite: GEOG795; and must have completed or be concurrently enrolled in ENCE662.
Restriction: Must be in Geospatial Information Sciences (Master's) program.

GEOG798 Selected Topics in Geography: Seminar Series (1 Credit)
Readings and discussions on selected topics in the field of geography.
Repeatable to: 6 credits if content differs.

GEOG799 Master's Thesis Research (1-6 Credits)

GEOG898 Pre-Candidacy Research (1-8 Credits)

GEOG899 Doctoral Dissertation Research (1-8 Credits)

GEOL - Geology

GEOL412 Geology of the Terrestrial Planets (3 Credits)
Geological features of Mercury, Venus, Mars and the Moon with an emphasis on results from recent NASA planetary mission. Topics include interior structure, impact cratering, tectonic and volcanic history, surface conditions, climate change, and habitability.
Prerequisite: GEOL341 or GEOL340.
Credit Only Granted for: GEOL489A or GEOL412.
Formerly: GEOL489A.

GEOL413 Geoscientific Modeling (3 Credits)
A model is a simplified representation of reality. Modeling is implicit or explicit in almost everything we do as geoscientists. Model construction, coding, and the concepts of parsimony vs complexity, robustness, validation, uncertainty, and the scientific interpretation of simulation results. Problem sets, independent study and participatory discussion of modeling applications in the current literature.
Prerequisite: MATH115; and two 400-level GEOL courses.
Recommended: Some experience in computer programming.
Restriction: Non-degree-seeking students require the permission of the instructor. Jointly offered with: GEOL613.
Credit Only Granted for: GEOL413, GEOL489G, GEOL613 or GEOL789G.
Formerly: GEOL489G.

GEOL423 Optical Mineralogy (4 Credits)
The optical behavior of crystals with emphasis on the theory and application of the petrographic microscope.
Prerequisite: GEOL100 or GEOL120; and GEOL110; and GEOL322. And CHEM131 and CHEM132; or (CHEM135 and CHEM136); or CHEM103.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL431 Vertebrate Paleobiology (4 Credits)
A survey of the evolution of the vertebrates, encompassing information from the diversity of living members, but concentrating on the contribution of the fossil record. Emphasis is on the phylogenetic systematics, comparative and functional anatomy, developmental biology, and stratigraphic distribution of major extinct and extant groups.
Prerequisite: BSCI207, BSCI392, GEOL104, GEOL204, or GEOL331; or permission of CMNS-Geology department.

GEOL435 Environmental Geochemistry (3 Credits)
An understanding of geochemical cycles of Earth's surface systems including soils, rivers, lakes, and estuaries and causes and implications of alteration of geochemical cycles. Topics include chemical weathering, soils, chemical composition of inland waters, hydrologic tracers, salinization, eutrophication, nutrient and metal pollution, and global geochemical cycles.
Prerequisite: MATH115; and (GEOL100 or GEOL120); and (GEOL436 or GEOL444). And CHEM131 and CHEM132; or (CHEM135 and CHEM136).
Restriction: Nondegree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL489W or GEOL435.
Formerly: GEOL489W.

GEOL436 Principles of Biogeochemistry (3 Credits)
An introduction to the basic principles of biogeochemistry including aspects of organic geochemistry, biochemistry, microbiology, global geochemical cycles, the origin of life and paleoenvironmental evolution.
Prerequisite: MATH120 or MATH140; or must have completed MATH220. And (GEOL100 or GEOL120); and GEOL322. And CHEM131 and CHEM132; or (CHEM135 and CHEM136).
Restriction: Non-degree-seeking students require the permission of the instructor. Cross-listed with: AOSC436.
Credit Only Granted for: GEOL436 or AOSC436.

GEOL437 Global Climate Change: Past and Present (3 Credits)
Introduction to the processes by which climate varies, the paleoclimate record, and projections of climate change into the 21st century, including discussion of climate sensitivity to external radiative forcing.
Prerequisite: MATH115 or MATH140; and (GEOL100 or GEOL120); and (CHEM131 or CHEM135); and (CHEM132 or CHEM136).

GEOL443 Petrology (4 Credits)
Study of igneous and metamorphic rocks: petrogenesis, distributions, chemical and mineralogical relations, macroscopic and microscopic descriptions, geologic significance.
Prerequisite: GEOL322. And CHEM131 and CHEM132; or (CHEM135 and CHEM136); or CHEM103. And must have completed or be concurrently enrolled in GEOL423; and (GEOL100 or GEOL120); and GEOL110.
Corequisite: Permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL444 Low Temperature Geochemistry (4 Credits)
Basic chemical principles, thermodynamics, and kinetics of low-temperature inorganic and organic geochemical reactions in a wide range of surface environments. These geochemical tools will be used to provide a context for understanding elemental cycling and climate change. Laboratories will include problem sets as well as wet chemical and mass spectrometric techniques used in low temperature geochemistry.
Prerequisite: GEOL322, GEOL100, and MATH115. And CHEM103; or (CHEM131 and CHEM132); or (CHEM135 and CHEM136).
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL445 High Temperature Geochemistry (4 Credits)
Review of chemical principles and their use in understanding processes of Earth, and solar system formation and differentiation. Topics include nucleosynthesis and cosmochemical abundances of elements, bonding and element partitioning, equilibrium thermodynamics and phase stabilities, radiogenic isotopes and geochronology, kinetics, and diffusion.
Prerequisite: GEOL322, GEOL100, and MATH115. And CHEM131 and CHEM132; or (CHEM135 and CHEM136); or CHEM103.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL446 Geophysics (3 Credits)
An introduction to modern geophysics. Topics include: global plate tectonics, plate motion, triple junctions, geomagnetism, earthquakes and faulting, reflection and refraction seismology, gravity and isostasy, heat flow and mantle dynamics, deep interior of the Earth, geophysical observations and measurements.
Prerequisite: PHYS141, MATH141, and MATH140; and (GEOL100 or GEOL120).
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL447 Observational Geophysics (3 Credits)
An introduction to practical signal processing, data analysis, and inverse theory in geophysics.
Prerequisite: MATH140 and MATH141; and (PHYS141, PHYS161, or PHYS171).

GEOL451 Groundwater (3 Credits)
An introduction to the basic geologic parameters associated with the hydrologic cycle. Problems in the accumulation, distribution, and movement of groundwater will be analyzed.
Prerequisite: GEOL110 and MATH140; and (GEOL120 or GEOL100); and (CHEM131 and CHEM132; or (CHEM135 and CHEM136); or CHEM103). Or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor; and junior standing or higher.

GEOL452 Watershed and Wetland Hydrology (3 Credits)
Physical processes by which water moves in watershed and wetland systems. Topics include: precipitation, infiltration, flow in the unsaturated zone, streamflow generation processes, and groundwater flow.
Restriction: Junior standing or higher; and all other students require the permission of the instructor.

GEOL453 Ecosystem Restoration (3 Credits)
Overview of ecosystem functions across biomes/geologic settings, and considerations and tradeoffs in ecosystem restoration strategies. Specific case studies and discussions will be aimed at understanding how structure can influence biophysical and biogeochemical processes supporting ecosystems, and then describes how rates, timing, and location of physical, chemical, and ecosystem processes can be altered by different restoration strategies to enhance ecosystem services.
Prerequisite: MATH120 or MATH140; or must have completed MATH220. And (CHEM131 or CHEM135); and (CHEM132 or CHEM136); and (GEOL100, GEOL120, or ENST200).
Restriction: Junior standing or higher; and permission of instructor is required of non-degree-seeking students.
Credit Only Granted for: GEOL453 or GEOL489L.
Formerly: GEOL489L.

GEOL455 Marine Geophysics (3 Credits)
Plate tectonics, earthquakes and faulting, isostasy and gravity, heat and mantle dynamics, ocean ridges and transform faults, hydrothermal vents, trenches and oceanic islands, subduction zones, accretionary and erosion wedges, sedimentary basins and continental rifts. Exploration of the oceans using geophysical methods.
Prerequisite: MATH141 and MATH140; and (GEOL120 or GEOL100). Or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL455 or GEOL489E.
Formerly: GEOL489E.

GEOL456 Engineering Geology (3 Credits)
An overview of engineering geology with an emphasis on physical understanding of natural hazards and natural resources. General theories of stress and strain, failure criteria, frictional stability, fluid flow in porous media and poroelasticity are introduced. Quantitative approaches on earthquakes, landslides, land subsidence, and geotechnical aspects of oil/gas exploration are discussed.
Prerequisite: PHYS141 and MATH141; and (GEOL120 or GEOL100). Or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL456 or GEOL489Z.
Formerly: GEOL489Z.

GEOL457 Seismology (3 Credits)
General overview of the basics of seismology, starting with wave propagation, seismic reflection and refraction. Applications to the determination of the seismic velocity and anisotropy structure of the Earth. Earthquake generation, postseismic deformation and creep events, relation to faulting and plate tectonics.
Prerequisite: GEOL120 or GEOL100; and (MATH141, GEOL110, and MATH140). Or permission of CMNS-Geology department.
Recommended: PHYS171, PHYS141, or PHYS161.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL457 or GEOL489A.
Formerly: GEOL489A.

GEOL460 Field Geophysics (4 Credits)
Students will become familiar with geophysical instrumentation used for both scientific and industrial applications. Students will be given an introduction to the use of geophysical instrumentation for data collection, processing, and analysis, design of field experiments for investigating field geophysical problems, and an introduction to the theory of instrument design and use. Instruments that will be covered include (but are not limited to): broadband seismometers, geophones, ground-penetrating radar, magnetotellurics, and Global Positioning Satellites.
Prerequisite: GEOL100 or GEOL120, MATH140, MATH141, and (PHYS141, PHYS161, or PHYS171).
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL463 Economic Geology (3 Credits)
The geological setting, and mineralogy of ore bodies, as well as the chemical and physical factors affecting the source, transport and deposition of metallic ores, petroleum and natural gas will be covered. The economics of mineral resources will be discussed.
Prerequisite: GEOL322; and (CHEM131 or CHEM135); and (CHEM132 or CHEM136).
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL489Q or GEOL463.
Formerly: GEOL489Q.

GEOL471 Geochemical Methods of Analysis (3 Credits)
Principles and application of geochemical analysis as applied to a variety of geological problems. X-ray and optical spectroscopy, X-ray diffraction, atomic absorption, electron microprobe, and electron microscopy.
Prerequisite: CHEM131 and CHEM132; or (CHEM135 and CHEM136); or CHEM103.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL473 Origin and Evolution of the Continents (3 Credits)
Introduction to current theories regarding the origin and evolution of the continents. Emphasis on development of critical reading and reasoning skills, and improvement of verbal and written communication.
Prerequisite: GEOL445 and GEOL443; or permission of instructor.
Restriction: Non-degree-seeking students require the permission of the instructor.
Formerly: GEOL489I.

GEOL488 Geology Colloquium (1 Credit)
Contemporary research topics and issues in geosciences are explored through the weekly Geology departmental colloquium and discussion of its contents.
Prerequisite: At least one 300 or 400-level Geology course of at least 3 credits.
Restriction: May not be taken concurrently with GEOL497 or GEOL497H.
Repeatable to: 4 credits.

GEOL489 Special Topics (3 Credits)
Recent advances in geology.
Prerequisite: Must have completed at least 2 upper-level GEOL courses plus one additional GEOL course.
Corequisite: GEOL393.
Restriction: Must be in Geology program; and junior standing or higher.

GEOL490 Geology Field Camp (6 Credits)
Intense field geology course taught off campus during the summer. Students describe and compile maps of formations and structures from outcrops, subsurface, and remotely sensed data. Special fees required.
Prerequisite: GEOL341 and GEOL443.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL491 Environmental Geology Field Camp (3-6 Credits)
Intensive field course designed for students of environmental geology. Students will learn to make maps, to describe soil profiles and site characteristics, to monitor hydrologic and groundwater conditions, and to measure geologic structures and stratigraphic sections.
Prerequisite: GEOL341, GEOL342, and GEOL451; or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL490 or GEOL491.

GEOL497 Recent Advances: Geology (3 Credits)
A survey of important recent advances in geological sciences in the context of the methods and practices of scientific research.
Prerequisite: Must have completed at least 2 upper-level GEOL courses.
Corequisite: GEOL393; and a third upper-level geology course.
Restriction: Must be in Geology program; and GPA of 3.0 or better in both overall and in all courses required for the major; and senior standing; and to be taken as late as possible in the program.
Credit Only Granted for: GEOL497 or GEOL489H.
Formerly: GEOL489H.

GEOL499 Special Problems in Geology (1-3 Credits)
Intensive study of a special geologic subject or technique selected after consultation with instructor. Intended to provide training or instruction not available in other courses which will aid the student's development in his or her field of major interest.
Prerequisite: (GEOL120 or GEOL100; and (GEOL102 and GEOL110)); or students who have taken courses with comparable content may contact the department. And permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL612 Geology and Geophysics of the Terrestrial Planets (3 Credits)
Geological features of Mercury, Venus, Mars and the Moon with an emphasis on results from recent NASA planetary mission. Class is organized to follow geological processes or observation throughout the inner solar system. Topics covered include interior structure, impact cratering, tectonic and volcanic history, surface conditions and climate change.
Prerequisite: Permission of CMNS-Geology department; or (GEOL446 and MATH141).
Recommended: Familiarity with MATLAB or MATHEMATICA.
Credit Only Granted for: GEOL680 or GEOL789A.
Formerly: GEOL789A.

GEOL613 Geoscientific Modeling (3 Credits)
A model is a simplified representation of reality. Modeling is implicit or explicit in almost everything we do as geoscientists. Model construction, coding, and the concepts of parsimony vs complexity, robustness, validation, uncertainty, and the scientific interpretation of simulation results. Problem sets, independent study and participatory discussion of modeling applications in the current literature.
Prerequisite: Must have completed MATH115 or equivalent; and any two 400 level GEOL courses, or equivalent. Or permission of instructor.
Recommended: Some experience in computer programming will be helpful but not necessary.
Restriction: Non-degree-seeking students require the permission of the instructor. Jointly offered with: GEOL413.
Credit Only Granted for: GEOL413, GEOL489G, GEOL613 or GEOL789G.
Formerly: GEOL789G.

GEOL614 Thermodynamics of Geological Processes (3 Credits)
Thermodynamics and its application to problems in mineralogy, petrology and geochemistry. Systematic development of the laws of thermodynamics and the principles of chemical equilibrium as applied to geological problems.
Prerequisite: PHYS142, GEOL322, and MATH141; and must have completed CHEM113.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL615 Planetary Habitability and Surface Chemistry (3 Credits)
Introduction to emerging areas of research pertaining to the formation of planetary bodies, the evolution of habitable environments, and the capacity of life to emerge in environments found within and/or outside of our Solar System.
Prerequisite: GEOL445; or permission of instructor.
Credit Only Granted for: GEOL615 or GEOL789B.
Formerly: GEOL789B.

GEOL635 Environmental Geochemistry (3 Credits)
Geochemical cycles of Earth's surface systems including soils, rivers, lakes, and estuaries and causes; and implications of their alteration. Topics include chemical weathering, soils, chemistry of inland waters, hydrologic tracers, salinization, eutrophication, nutrient and metal pollution, and global geochemical cycles.
Prerequisite: MATH115; and (GEOL100 or GEOL120); and (GEOL436 or GEOL444). And CHEM131 and CHEM132; or (CHEM135 and CHEM136).
Restriction: Nondegree-seeking students require the permission of the instructor. Jointly offered with GEOL435.
Credit Only Granted for: GEOL635, GEOL789W, GEOL435 or GEOL489W.
Formerly: GEOL789W.

GEOL636 Ecosystem Restoration (3 Credits)
A further understanding of ecosystem functions across biomes/geologic settings, and developing practical applications in ecosystem restoration strategies through a graduate level project. Specific case studies and discussions will be aimed at understanding how structure can influence biophysical and biogeochemical processes supporting ecosystems, and then describes how rates, timing, and location of physical, chemical, and ecosystem processes can be altered by different restoration strategies to enhance ecosystem services. A project will then be used to apply restoration principles towards solving tangible environmental problems and communication to managers.
Prerequisite: MATH120 or MATH140; and (CHEM131 or CHEM135); and (CHEM132 or CHEM136); and (GEOL100, GEOL120, or ENST200).
Restriction: Equal preference is given to students enrolled in GEOL, MEES, CONS, ENST, AOSC, and civil and environmental engineering graduate programs; and permission of Instructor required for non degree seeking students.
Credit Only Granted for: GEOL453 or GEOL489L.
Formerly: GEOL489L.

GEOL647 Observational Geophysics (3 Credits)
Introduces graduate students to instrument design and performance, signal processing, data analysis and inverse theory in geophysics.
Prerequisite: MATH140, MATH141, and PHYS141; and (PHYS161 or PHYS171).
Credit Only Granted for: GEOL789O or GEOL647.
Formerly: GEOL789O.

GEOL650 Isotope and Trace Element Geochemistry (3 Credits)
Trace elements and isotopes in geology, including modern applications in geochronology and petrogenesis.
Prerequisite: GEOL443; or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL651 Statistics for Geoscientists (3 Credits)
Practical approach to basic statistics applied in the geosciences. Experimental design, elementary statistics and probability, sequence analysis, spatial analysis, linear regression, nonparametric statistics, bivariate, multivariate and principal components analysis of variance, hypothesis testing. Problem sets and participatory discussion of statistical applications in the current literature.
Prerequisite: MATH115; and non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL789V or GEOL651.
Formerly: GEOL789V.

GEOL652 Advanced Watershed and Wetland Hydrology (3 Credits)
Physical and chemical processes in watershed and wetland systems: with an emphasis on redox reactions.
Prerequisite: GEOL452; or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL653 Advanced Problems in Economic Geology (3 Credits)
A systematic study of particular ore deposit types or areas of mineralization, primarily involving major economically important metals. Geologic setting, mineralogy and form and character of the ore bodies, chemical and physical factors affecting source, transport and deposition of ore forming fluids.
Prerequisite: GEOL453.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL654 Fluvial Geomorphology Seminar (3 Credits)
Fluvial geomorphology is the study of the movement of water and sedimentin stream channels. This includes: formation of channels, open channel hydraulics, sediment transport or bedload and suspended load, river morphology and landscape evolution. The course is designed for graduate students and advanced undergraduates.
Recommended: GEOL452 and GEOL340.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL654 or GEOL789B.
Formerly: GEOL789B.

GEOL655 Marine Geophysics (3 Credits)
An introduction to geophysical aspects of global tectonics. Quantitative geophysical approached are introduced for: past and present plate motions, seismology and interior of the Earth, gravity and isostasy, heat and mantle dynamics. Ocean ridges, hydrothermal vents, transform faults, oceanic core complex, ocean trenches and subduction zones, accretionary anderosion wedges, rift and rift margins, convergence and collisons, sedimentary basins.
Prerequisite: Permission of CMNS-Geology department.
Recommended: GEOL120 or GEOL100; and MATH141.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL655 or GEOL789E.
Formerly: GEOL789E.

GEOL656 Engineering and Environmental Geology (3 Credits)
An overview of mechanical aspects of earthquakes as a result of fault instability. Quantitative approaches on soil and rock strength, instability on earthquakes, landslides, land subsidence, and geotechnical aspects of oil/gas exploration are discussed. Emphasis is on theoretical framework of mechanics of earthquake and faulting, earthquake source mechanisms, earthquake scaling relations, the seismic cycle etc.
Prerequisite: GEOL100, GEOL110, MATH141, and PHYS141; or permission of instructor.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL656 or GEOL789Z.
Formerly: GEOL789Z.

GEOL657 Seismic Wave Propagation (3 Credits)
A description of the physics of seismic wave propagation and their applications to the determination of the structure of the Earth and the mechanics of earthquakes.
Prerequisite: MATH140 and MATH141; and (PHYS141, PHYS161, or PHYS171); and permission of CMNS-Geology department.
Recommended: GEOL100 or GEOL120; and (MATH241 and MATH246); and (PHYS260 or PHYS273).
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL657 or GEOL789A.
Formerly: GEOL789A.

GEOL670 Physical Oceanography (3 Credits)
Ocean observations. Water masses, sources of deep water. Mass, heat, and salt transport, geochemical tracers. Western boundary currents, maintenance of the termocline. Coastal and estuarine processes. Surface waves and tides. Ocean climate.
Prerequisite: Permission of CMNS-Atmospheric & Oceanic Science department; or permission of CMNS-Geology department. Jointly offered w ith AOSC420, AOSC670.
Credit Only Granted for: GEOL670, AOSC670 or AOSC420.

GEOL671 Analytical Methods in Mineralogy (3 Credits)
An intensive study in the operation and application of instrumentation in mineralogical problems. Emphasis on designing and testing methods of analysis for use in the student's research problems in geology.
Prerequisite: CHEM471.
Restriction: Non-degree-seeking students require the permission of the instructor.

GEOL672 Tectonics (3 Credits)
The study of the development of the lithosphere on Earth and other rocky planets and moons. Emphasis on the student led discussion and improvement of scientific writing.
Prerequisite: GEOL341; or permission of CMNS-Geology department.
Restriction: Non-degree-seeking students require the permission of the instructor.
Credit Only Granted for: GEOL672 or GEOL789C.
Formerly: GEOL789C.

GEOL680 Geodynamics (3 Credits)
The mechanics and dynamics of the Earth's interior and their applications to problems of Geophysics. This course considers several rheological descriptions of Earth materials (brittle, elastic, linear and nonlinear fluids, and viscoelastic) and emphasizes analytical solutions to simplified problem.
Prerequisite: Permission of CMNS-Geology department; or (MATH241, MATH462, and GEOL446).
Recommended: Familiarity with MATLAB or MATHEMATICA.
Credit Only Granted for: GEOL680 or GEOL789J.
Formerly: GEOL789J.

GEOL681 Physics of Planetary Interiors and Surfaces (3 Credits)
Formation of planets in the solar system; segregation and core formation in terrestrial planets; formation of early atmosphere; tectonics and volcanism; geochemical and cosmochemical constraints; planetary geomorphology.
Prerequisite: Advanced undergraduate geophysics, astronomy or geochemistry; and GEOL446. Or permission of CMNS-Geology department.
Credit Only Granted for: GEOL681 or GEOL789X.
Formerly: GEOL789X.

GEOL682 Computational Geodynamics (3 Credits)
An introduction to the techniques used to model geodynamics processes. The focus is on understanding and applying techniques, not on proving their worth and programming. Students will learn about Finite Element, Boundary Elements, and Finite Differences methods. We will not explore these topics with the rigor expected by Applied Mathematics but focus instead on practical aspects and their application to geodynamics.
Prerequisite: Permission of CMNS-Geology department; or (MATH462, GEOL680, and MATH240).
Recommended: Familiarity with MATLAB.
Credit Only Granted for: GEOL682 or GEOL789M.
Formerly: GEOL789M.

GEOL688 Geology Colloquium (1 Credit)
Contemporary research topics and issues in geosciences are explored through the weekly Geology departmental colloquium and discussion of its contents.
Restriction: Restricted to graduate students in Geology who have not yet advanced to PhD candidacy. Repeatable for credit with changing content. May not be taken for credit concurrently with GEOL497 or GEOL497H.
Repeatable to: 4 credits.

GEOL690 Geoscience Communications (3 Credits)
Explores the style and logic of scientific writing including abstracts, articles, and proposals, as well as the preparation of clear and concise presentations, in order to enhance the quality of scientific communication and hasten the pace of successful publications.
Credit Only Granted for: GEOL690, GEOL789R, or GEOL789S.
Formerly: GEOL789R and GEOL789S.

GEOL789 Recent Advances in Geology (2-4 Credits)
Recent advances in geology research.

GEOL798 Seminar in Geology (1-3 Credits)
Discussion of special topics in current literature in all phases of geology.
Repeatable to: 9 credits if content differs.

GEOL799 Master's Thesis Research (1-6 Credits)

GEOL898 Pre-Candidacy Research (1-8 Credits)

GEOL899 Doctoral Dissertation Research (1-8 Credits)

GERM - Germanic Studies

GERM401 Advanced Conversation (3 Credits)
Development of fluency in spoken German to achieve advanced level.
Prerequisite: GERM302; or students who have taken courses with comparable content may contact the department.

GERM402 Advanced Conversation and Composition (3 Credits)
Advanced instruction in and acquisition of written and oral communication skills in German
Prerequisite: GERM302; or students who have taken courses with comparable content may contact the department.
Restriction: Must not have completed GERM401 or GERM403.
Credit Only Granted for: (GERM401 and GERM403) or GERM402.

GERM403 Advanced Composition (3 Credits)
Advanced instruction in and acquisition of German writing skills.
Prerequisite: GERM302; or students who have taken courses with comparable content may contact the department.

GERM415 German/English Translation I (3 Credits)
An intensive presentation of German grammar limited exclusively to reading skill; graded readings in the arts and sciences. Instruction in English; cannot be used to satisfy the arts and humanities foreign language requirement.
Restriction: Must not have completed GERM101, GERM102, GERM103, GERM201, GERM202, GERM203, GERM204, GERM301, or GERM302.

GERM419 Selected Topics in German Language Studies (3 Credits)
The analysis of the German language as a reflection of cultural, functional, and social practice in the German-speaking world.
Prerequisite: GERM302; and permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

GERM436 The Usual Suspects: Criminals in German Literature and Film (3 Credits)
An examination of how historical, cultural and political discourses in German-speaking countries influence social norms and criteria for judging what is considered socially acceptable or "deviant". Texts and films span from the 18th to 21st centuries. Taught in German.
Prerequisite: GERM320 or GERM322; or permission of instructor.

GERM439 Selected Topics in German Literature (3 Credits)
Special study of an author, school, genre, or theme. Taught in German.
Prerequisite: GERM320, GERM321, or GERM322; or permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

GERM441 Border Crossings and Cultural Transfers (3 Credits)
Border Crossings and Cultural Transfers emphasizes the transnational and global dimensions of German culture, analyzing the interrelationship of dominant and minority cultures within Germany and/or the impact of German cultures abroad. Topics include migration, exile, (post)colonialism, and globalization. Taught in German.
Prerequisite: GERM320 or GERM322.

GERM442 Gender and Sexuality in German Literature and Society (3 Credits)
Gender and Sexuality in German Literature and Society analyzes gender and sexuality as key discourses for understanding German-speaking literatures, cultures, and societies. Topics include the history of sexuality; death and desire; and representations of gender in German literature. Taught in German.
Prerequisite: GERM320 or GERM322.

GERM443 Literature as Cultural Discourse (3 Credits)
Investigates literature as cultural discourse in the construction of knowledge, emphasizing a discursive approach to analyzing a range of literary texts. Taught in German.
Prerequisite: GERM320 or GERM322.

GERM444 The German-Jewish Experience (3 Credits)
Focuses on the German-Jewish experience as a key dimension of European history, literature, and culture. Topics include Heinrich Heine, German-Jewish authors and texts, and the Holocaust in literature and film.
Prerequisite: GERM320 or GERM322.
Additional Information: Taught in German.

GERM449 Selected Topics in Germanic Studies (3 Credits)
Study of a linguistic, literary or cultural topic in Yiddish, Netherlandic, or Scandinavian studies.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

GERM457 Germany: Energy Transition, Climate Change, and Sustainability (3 Credits)
Interdisciplinary examination of Germany as a leading model in dealing with contemporary issues of sustainability as well as the economic, social, and political impacts of climate change in a global world. Students will learn the basics of climate change, examine policy tools (e.g. carbon taxes, regulations, incentives, etc.) and technological innovations to curb the causes of climate change and promote sustainable practices. Students will also learn how cultural values and traditions inform policy making by examining the history of the environmental movement in German cultural artifacts (e.g., art, literature, grass-roots social movements, etc.). Designed to appeal to students with a variety of backgrounds (technical, policy and government, and humanities), the course blends site visits (e.g. coal mines, government offices, technical universities, artist studios, grass-roots collectives, museums, parks, etc.) with academic lectures by experts in pertinent fields and faculty-led discussion groups. Students will receive an overarching and holistic overview of the economic, political, and cultural costs of climate change as well as current efforts to offset the negative impacts through greater sustainability. Taught in English.Cross-listed with: AREC357.

GERM458 Literary or Media Genres (3 Credits)
Literary or Media Genres studies the formal and stylistic dimensions of specific genres, emphasizing genre as a social, political, and aesthetic category. Topics include pop literature; the history of German drama; and German film genres among others.
Prerequisite: GERM320 or GERM322.
Repeatable to: 6 credits if content differs.
Additional Information: Taught in German.

GERM473 Variation in Contemporary German Language (3 Credits)
Examines the unique, multilingual society that is modern Germany, exploring issues such as regional varieties, gendered language, language reform (and resistance to it), public and media speech, the influence of American English on colloquial speech and in specific fields, and the problems of immigrant communities acquiring both dialect and standard German.
Prerequisite: GERM302; or permission of instructor.
Credit Only Granted for: GERM473 or GERM673.

GERM488 Capstone Seminar (3 Credits)
Provides an opportunity for German majors (usually in their senior year) to demonstrate that they have achieved the goals for learning established and approved by the department. Students analyze in depth a research topic and apply their accumulated learning. Requirements include engaging in an in-depth research project (research paper or media project) and an in-class presentation of their research to faculty and student peers. Taught in German.
Prerequisite: Students must have completed two 400-level courses taught in German.

GERM489 Social Issues in German Culture (1-3 Credits)
Special topics course examining the cultural constructions and representations of important social, political, and linguistic issues, investigating their connection to German values and institutions. Taught in German.
Prerequisite: GERM320 or GERM322.
Repeatable to: 6 credits if content differs.

GERM498 Honors Thesis Writing (3 Credits)
Required for students pursuing departmental honors in Germanic languages and literatures. Under the direction of a German department faculty member, students write their honors theses.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

GERM499 Directed Study (1-3 Credits)
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

GERM618 College Teaching of German (1 Credit)
Instruction, demonstration and classroom practice under supervision of modern procedures in the presentation of elementary German courses to college age students.
Repeatable to: 3 credits.

GERM620 Methods of German Literary Studies I: Theory (3 Credits)
History, methods and concepts of German literary studies. The teaching modules include a general introduction to "Germanistik," an in-depth discussion of literary theory and criticism, and the typology of genres.

GERM673 Variation in Contemporary German (3 Credits)
Examines the unique, multilingual society that is modern Germany, exploring issues such as regional varieties, gendered language, language reform (and resistance to it), public and media speech, the influence of American English on colloquial speech and in specific fields, and the problems of immigrant communities acquiring both dialect and standard German. This may count for the upper-division requirement of the German major.Jointly offered with GERM473.
Credit Only Granted for: GERM489L, GERM67 3, or GERM689L.

GERM689 Special Topics - M.A. Level (1-3 Credits)
M.A.-level study of a literary, linguistic or cultural topic in German or Germanic studies.
Repeatable to: 6 credits if content differs.

GERM798 Master's Independent Study (1-3 Credits)
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

GERM799 Master's Thesis Research (1-6 Credits)

GERM818 Seminar: The Middle Ages (3 Credits)
Study of one or more representative authors or works of the Middle Ages.
Repeatable to: 9 credits if content differs.

GERM819 Seminar: The 16th and 17th Centuries (3 Credits)
The German literature of the Humanists, the Reformation and the Baroque as illustrated by study of one or more authors of the 16th or 17th centuries.
Repeatable to: 9 credits if content differs.

GERM828 Seminar: The 18th Century (3 Credits)
Study of one or more authors from the Enlightenment, Sentimentalism, Stress, or Classicism periods.
Repeatable to: 9 credits if content differs.

GERM829 Seminar: The 19th Century (3 Credits)
Study of one or more authors of Romanticism, Biedermeier, Young Germany or Realism.
Repeatable to: 9 credits if content differs.

GERM838 Seminar: The 20th Century (3 Credits)
Study of a literary movement or of one or more authors from the period of Naturalism to the present.
Repeatable to: 9 credits if content differs.

GERM839 Seminar: Special Topics (3 Credits)
Study of a topic of a general nature and not limited to any specific century.
Repeatable to: 9 credits if content differs.

GERM879 Seminar in Germanic Philology (3 Credits)
In depth study of a topic in Germanic or Indo-European philology comparative Germanic grammar, runology, dialect geography, Eddic or Skaldic poetry, Indo-European studies.
Repeatable to: 9 credits if content differs.

GERM888 Doctoral Independent Study (1-3 Credits)
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

GERM889 Seminar in Germanic Area Studies (3 Credits)
Comprehensive study of a selected topic in German or Germanic area studies: history of ideas, cultural history, Germanic literatures other than German, folk literature and folklore.
Repeatable to: 9 credits if content differs.

GERM898 Pre-Candidacy Research (1-8 Credits)
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

GERM899 Doctoral Dissertation Research (1-8 Credits)

GREK - Greek

GREK403 Greek Tragedy (3 Credits)
Additional Information: Readings are in ancient Greek.

GREK411 Modern Greek Literature and History (3 Credits)
Students will study historical and political events in Greece during the 19th and 20th centuries through the viewpoint of the man of letters. Poetry, prose, plays, and essays reflect national emancipation, social reconstruction, and political struggles. Readings and discussion are in Modern Greek.
Prerequisite: Students must have earned a grade of C- or better in a 300-level Modern Greek course.
Restriction: Permission of instructor.
Credit Only Granted for: GREK311 or GREK411.
Formerly: GREK311.

GREK415 Homer (3 Credits)
Extensive readings in Greek from the Iliad or the Odyssey, with special attention to the features of Homeric style and the relationship between the two epics.
Prerequisite: Permission of ARHU-Classics department.

GREK472 History and Development of the Greek Language (3 Credits)
Mastery of ancient Greek through grammar review, prose composition, and analysis of historical developments in Greek writers' modes of expression.
Restriction: Permission of instructor.

GREK488 Greek Readings (3 Credits)
The reading of one or more selected Greek authors. Reports.
Prerequisite: Permission of ARHU-Classics department.
Repeatable to: 6 credits if content differs.
Additional Information: Readings are in ancient Greek.

GREK499 Independent Study in Greek Language and Literature (1-3 Credits)
Prerequisite: Permission of ARHU-Classics department.
Repeatable to: 6 credits if content differs.

GREK603 Greek Tragedy (3 Credits)
The reading of two tragedies of the Athenian tragedians. Detailed discussion of historical background, literary art, thought, and the circumstances and manner of their production. Other tragedies will be read in English.

GREK604 Homer (3 Credits)
The extensive and intensive reading of Homer, with concentration on one of his two epics. Discussion of the language, artistic qualities, and thought of the poems, and of modern views concerning their orgin and literary qualities.

GREK606 Greek Historians (3 Credits)
Survey of the Greek historians, concentrating on Herodotus and Thucydides, contrasting the two historians in the areas of subject, methods of research, composition, and achievement.

GREK672 History and Development of the Greek Language (3 Credits)
Mastery of ancient Greek through grammar review, prose composition, and analysis of historical developments in Greek writers' modes of expression.
Restriction: Permission of instructor.

GREK688 Special Topics in Greek Literature (3 Credits)
Repeatable to: 9 credits if content differs.

GREK699 Independent Study in Greek Literature (1-3 Credits)
Prerequisite: Permission of ARHU-Classics department.
Repeatable to: 6 credits if content differs.

GREK799 Master's Thesis Research (1-6 Credits)

GVPT - Government and Politics

GVPT402 International Law (3 Credits)
A study of the basic character, general principles and specific rules of international law, with emphasis on recent and contemporary trends in the field and its relation to other aspects of international affairs.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics program; and junior standing or higher.

GVPT404 Political Economy of Foreign Aid (3 Credits)
The world spends hundreds of billions of dollars on foreign aid every year. The effects of this aid spending are controversial. Research supports both pessimistic and optimistic views of foreign aid's effectiveness, with little consensus. Where does aid money go? What are the motivations of aid donors? Is foreign aid effective at achieving its goals? Why or why not? This course is designed to survey the promise and the challenges of foreign aid as a policy tool. The first half of the course will focus on the motivations and goals of foreign aid. We will consider various foreign aid donors, such as countries, institutions, and individuals, to understand the motivations behind and effects of foreign aid. We will create a typology of foreign aid agendas, motivations, and donors. The second half of the course will consider the challenges specific to foreign aid. This includes both technical challenges and political challenges. We will consider the strategies that aid donors and organizations have taken to try to overcome these challenges.
Recommended: GVPT200.
Restriction: Must be in Government & Politics or Government & Politics: International Relations program.
Credit Only Granted for: GVPT409R or GVPT404.
Formerly: GVPT409R.

GVPT406 International Organizations (3 Credits)
A basic introduction to the full range of international organizations that have come into being over the past century and one-half, including those that aspire to be universal or global, those with a geopolitical or regional focus, and those that address specific structural or functional areas of human endeavor or issue areas.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics program; and junior standing or higher. Or must be in Government & Politics: International Relations program; and junior standing or higher.

GVPT409 Seminar in International Relations and World Politics (3 Credits)
Reading, writing, and research on topics in international relations and world politics. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT200.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations) ; and junior standing or higher.
Repeatable to: 9 credits if content differs.

GVPT410 Politics of Nationalist and Ethnic Conflict (3 Credits)
An examination of the major causes and consequences of ethnic, nationalist, and separatist conflict. The course will focus on both theories of ethnicity and nationalism, as well as theories of conflict related to these issues. The course will also explore empirical trends in ethnic and nationalist politics.
Prerequisite: GVPT200.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations).
Credit Only Granted for: GVPT409M or GVPT410.
Formerly: GVPT409M.

GVPT411 Conflict in the International System (3 Credits)
In this course, we will examine conflict, peace, and conflict resolution in contemporary international politics. We will interrogate what we mean by concepts such as peace, conflict, and violence, the different forms that these phenomena can take, and how we can measure their occurrence. We will discuss theoretical explanations for why individuals and groups have disputes, why these actors choose to use violence (or not) in these disputes, and ways in which violent disputes can be resolved peacefully. We will examine these arguments in a detailed study of conflicts in the Middle East, as well as by evaluating published articles that examine the effectiveness of conflict management strategies such as peacekeeping.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics or Government & Politics: International Relations program.
Credit Only Granted for: GVPT409P or GVPT411.
Formerly: GVPT409P.

GVPT413 Peace, Justice, and Conflict Resolution (3 Credits)
An examination of classic and contemporary perspectives on peace, justice, and conflict resolution after armed conflict. The goal of this course is to expose students to the advantages, risks, and challenges of the most prominent methods of conflict mitigation and resolution, including mediation and arbitration; peacekeeping, peacemaking, and peacebuilding; the protection of civilians, Responsibility to Protect, and humanitarian assistance; elections, democratization, and power-sharing; and transitional reconciliation and justice. We will do this by reading, discussing, and synthesizing classic and cutting-edge Political Science research on these topics.
Recommended: GVPT200.
Restriction: Must be in Government & Politics or Government & Politics: International Relations program.
Credit Only Granted for: GVPT409A or GVPT413.
Formerly: GVPT409A.

GVPT414 International Relations of East Asia (3 Credits)
An examination of international relations in East Asia, focusing mostly on Northeast Asia. The course will provide some background on the evolution of international politics in the region over the past several decades, and will examine several contemporary issues--including the North Korean nuclear issue, the relationship across the Taiwan Strait, and maritime disputes in the East and South China Seas--in depth.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics or Government & Politics: International Relations program.
Credit Only Granted for: GVPT409E or GVPT414.
Formerly: GVPT409E.

GVPT417 Seminar in Advanced Topics in Environmental Policy Analysis (3 Credits)
A series of critical tools and methods used to analyze environmental policy. This class should be of interest to students who are either considering a career or graduate studies in environmental protection.
Prerequisite: GVPT273.
Restriction: Must be in one of the following programs (Government & Politics; Environmental Sci&Policy-Env Politics & Policy).
Credit Only Granted for: GVPT419B or GVPT417.
Formerly: GVPT419B.

GVPT419 Seminar in Public Policy (3 Credits)
Reading, writing, and research on topics in public policy. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT241 and GVPT170.
Recommended: GVPT270.
Restriction: Must be in Government & Politics program.
Repeatable to: 6 credits if content differs.

GVPT420 The Logic and Practice of Measuring Political Behavior (3 Credits)
Introduction to concepts and practices used for measuring political behavior. Political analysis is an increasingly quantitative field. It is crucial for students of political behavior to learn how to define concepts in concrete ways, examine different methods of measuring concepts, learn how to test the quality of chosen measures, learn how to construct richer measures out of multiple questions, and finally how to examine the relationship between multiple measures of similar concepts. Common pitfalls, errors, bias, and ethics will be examined along the way.
Prerequisite: GVPT201.
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.

GVPT421 Advanced Quantitative Methods (3 Credits)
Advanced quantitative methods for political science research.
Prerequisite: GVPT201.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations).

GVPT422 Quantitative Political Analysis (3 Credits)
Introduction to quantitative methods of data analysis, including selected statistical methods, block analysis, content analysis, and scale construction.
Prerequisite: GVPT241 and GVPT170.
Recommended: GVPT220.
Restriction: Must be in Government & Politics program.
Credit Only Granted for: BIOM301, BMGT230, CCJS200, ECON230, EDMS451, GEOG306, GEOL351, GVPT422, INST314, JOUR405, PSYC200 or SOCY201.

GVPT423 Elections and Electoral Behavior (3 Credits)
An examination of various topics relating to elections; the focus includes the legal structure under which elections are conducted, the selection and nomination process, the conduct of election campaigns, and patterns of political participation and voting choice in different types of elections.
Prerequisite: GVPT241 and GVPT170.
Restriction: Must be in Government & Politics program.

GVPT424 Quantitative Study of International Relations (3 Credits)
A comprehensive introduction to the quantitative study of international conflict. Students will perform statistical analysis of international conflict data using the R software platform.
Prerequisite: GVPT201.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations).
Credit Only Granted for: GVPT409H (Fall 2015 and Fall 2016) or GVPT424.
Formerly: GVPT409H (Fall 2015 and Fall 2016).

GVPT428 Topics in Formal Theories of Political Behavior and Politics (3 Credits)
An evaluation of theories of political behavior such as game, social choice and voting theory, and their applications to problems of distribution and social justice, community organizing, responsive public policy, institutional design, and alliance and coalition formation.
Prerequisite: GVPT241 and GVPT221.
Restriction: Must be in Government & Politics program.
Repeatable to: 6 credits if content differs.

GVPT429 Problems in Political Behavior (3 Credits)
The problem approach to political behavior with emphasis on theoretical and empirical studies on selected aspects of the political process.
Prerequisite: GVPT241.
Recommended: GVPT220.
Restriction: Must be in Government & Politics program.

GVPT431 Introduction to Constitutional Law (3 Credits)
A systematic inquiry into the general principles of the American constitutional system, with special reference to the role of the judiciary in the interpretation and enforcement of the federal constitution.
Prerequisite: GVPT170 and GVPT331.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations) ; and junior standing or higher.

GVPT432 Civil Rights and the Constitution (3 Credits)
A study of civil rights in the American constitutional context, emphasizing freedom of religion, freedom of expression, minority discrimination, and the rights of defendants.
Prerequisite: GVPT170 and GVPT331.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations).

GVPT433 The Judicial Process (3 Credits)
An examination of judicial organization in the United States at all levels of government, with some emphasis on legal reasoning, legal research, and court procedures.
Prerequisite: GVPT241 and GVPT331.
Restriction: Must be in Government & Politics program.

GVPT439 Seminar in Public Law (3 Credits)
Reading, writing, and research on topics in public law. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT241 and GVPT170.
Recommended: GVPT331.
Restriction: Must be in Government & Politics program; and junior standing or higher.
Repeatable to: 6 credits if content differs.

GVPT441 History of Political Theory: Ancient and Medieval (3 Credits)
A survey of the principal political theories set forth in the works of writers before Machiavelli.
Prerequisite: GVPT241.
Restriction: Must be in Government & Politics program; and junior standing or higher.

GVPT442 History of Political Theory--Medieval to Recent (3 Credits)
A survey of the principal theories set forth in the works of writers from Machiavelli to Nietzsche.
Prerequisite: GVPT241.
Restriction: Must be in Government & Politics program.

GVPT443 Contemporary Political Theory (3 Credits)
A survey of the principal political theories and ideologies set forth in the works of writers from Karl Marx to the present.
Prerequisite: GVPT241.
Restriction: Must be in Government & Politics program.

GVPT445 Marxism and Postmarxism (3 Credits)
The study of Marxist thought and an assessment of the critical transformations and reassessments of the theory and practice of Marxism.
Restriction: Must be in a major within BSOS-Government & Politics department.

GVPT448 Non-Western Political Thought (3 Credits)
Examination of works by major authors and general themes of political thought originating in Asia, the Middle East, and Africa. This is not a survey of all non-Western political thought, but a course to be limited by the professor with each offering.
Prerequisite: GVPT241.
Restriction: Must be in Government & Politics program.
Additional Information: Permission of department required for repeat.

GVPT449 Seminar in Political Philosophy (3 Credits)
Reading, writing, and research on topics in political philosophy. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT241.
Restriction: Must be in Government & Politics program.
Repeatable to: 6 credits if content differs.

GVPT454 Seminar in the International Relations of China (3 Credits)
Explores the foreign relations behavior of the People's Republic of China, with focus on the contemporary era.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics program; and junior standing or higher. Or must be in Government & Politics: International Relations program; and junior standing or higher.

GVPT456 The Politics of Terrorism (3 Credits)
Examination of the definition, causes and organization of terrorist activity, along with key domestic and international counter- and anti-terrorism responses. Special emphasis on challanges and opportunities to the scientific study of terrorism.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.
Credit Only Granted for: GVPT456 or GVPT459T.
Formerly: GVPT459T.

GVPT457 American Foreign Relations (3 Credits)
The principles and machinery of the conduct of American foreign relations and an analysis of the major foreign policies of the United States.
Prerequisite: GVPT200.
Restriction: Must be in Government & Politics program; and junior standing or higher.

GVPT458 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

GVPT459 Seminar in Comparative Politics (3 Credits)
Reading, writing, and research on topics in comparative politics. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT200; and (GVPT282 or GVPT280).
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.
Repeatable to: 6 credits if content differs.

GVPT460 State Politics and Government (3 Credits)
A study of the structure, procedures and policies of state governments with special emphasis on intergovernmental relationships, and with illustrations from Maryland governmental arrangements.
Prerequisite: GVPT241 and GVPT170.
Recommended: GVPT260.
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.

GVPT461 Local Politics and Government (3 Credits)
An introduction to local government and politics in the U.S. context. The course explores the evolution of local jurisdictions, particularly cities, and the politics of local level decision making.
Prerequisite: GVPT170.
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.
Credit Only Granted for: GVPT461 or GVPT479L.
Formerly: GVPT479L.

GVPT473 The U.S. Congress (3 Credits)
A detailed survey of lawmaking and the legislative process, emphasizing the U.S. Congress, and its members.
Prerequisite: GVPT241 and GVPT170.
Restriction: Junior standing or higher. And must be in Government & Politics program; or must be in Government & Politics: International Relations program.

GVPT474 Political Parties (3 Credits)
A descriptive and analytical examination of American political parties, nominations, elections, and political leadership.
Prerequisite: GVPT241 and GVPT170.
Restriction: Must be in Government & Politics program.

GVPT475 The Presidency and the Executive Branch (3 Credits)
An examination of the U.S. presidency in historical and contemporary perspective: nomination and electoral politics and the president's place in policy-making, administration, and public opinion.
Prerequisite: GVPT241 and GVPT170.
Restriction: Must be in Government & Politics program; and junior standing or higher.

GVPT476 The Business Government Relationship (3 Credits)
Examines the structures, process, and outcomes of business and government and the politics and products of their cooperative-adversarial relationships in the United States. The design integrates interest group and administrative politics and the public policy process.
Prerequisite: GVPT241 and GVPT170.
Recommended: GVPT270.
Restriction: Must be in Government & Politics program.

GVPT477 Voting and Participation (3 Credits)
A study of the factors that influence individual vote choice and voter participation in the U.S. The course will introduce political science research pertaining to both topics and will engage current controversies over such things as political campaign laws and the various state and federal rules that govern election administration.
Prerequisite: GVPT170 and GVPT241.
Restriction: Must be in Government & Politics program.

GVPT479 Seminar in American Politics (3 Credits)
Reading, writing, and research on topics in American politics. Both substantive issues and methodological approaches will be considered.
Prerequisite: GVPT241 and GVPT170.
Restriction: Must be in Government & Politics program; and junior standing or higher.
Repeatable to: 6 credits if content differs.

GVPT481 Government and Administration of Russia and the States of the Former Soviet Union (3 Credits)
A comparative study of the governmental systems and political processes of the states of the former Soviet Union.
Prerequisite: GVPT200; and (GVPT282 or GVPT280).
Restriction: Must be in Government & Politics program.

GVPT482 Government and Politics of Latin America (3 Credits)
A comparative study of the governmental systems and political processes of the Latin American countries.
Restriction: Must be in Government & Politics program; or must be in Government & Politics: International Relations program.

GVPT484 Government and Politics of Africa (3 Credits)
A comparative study of the governmental systems and political processes of the African countries, with special emphasis on the problems of nation-building in emergent countries.
Prerequisite: GVPT282 or GVPT280.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations).

GVPT485 Government and Politics of the Middle East (3 Credits)
A comparative study of the governmental systems and political processes of Middle Eastern countries, with special emphasis on the problems of nation-building in emergent countries.
Prerequisite: GVPT200; and (GVPT282 or GVPT280).
Restriction: Must be in Government & Politics program.
Credit Only Granted for: GVPT485 or GVPT459E.
Formerly: GVPT459E.

GVPT487 Government and Politics of China (3 Credits)
Discussion of major issues in the study of the domestic politics of the People's Republic of China.
Restriction: Must be in one of the following programs (Government & Politics; Government & Politics: International Relations) ; and junior standing or higher.
Credit Only Granted for: GVPT359A or GVPT487.
Formerly: GVPT359A.

GVPT600 Professionalization Seminar in Political Science (1 Credit)
An introduction to the practices, norms, and expectations of professional political science.
Restriction: Must be in Government and Politics (Doctoral) program.

GVPT604 Introduction to War and Armed Conflict in World Politics (3 Credits)
Examines major theories of both international and civil wars and reviews major empirical studies that test theories of conflict. The topics include the onset of armed conflict, the duration and outcomes of wars, and the durability of peace in the aftermath of wars. The focus is on developing an understanding of central debates in the literature and primary empirical findings from quantitative and cross-national analyses that are of policy relevance.
Recommended: GVPT200.
Restriction: Must be in the MA in International Relations program; or permission of Government and Politics department.

GVPT605 Introduction to Conflict and Cooperation in the World Economy (3 Credits)
This seminar examines major theoretical approaches and empirical studies of international political economy, contemporary dynamics of globalization, the role of domestic politics in the formation of foreign economic policies of states, the dynamics of international trade and investment disputes, and role of international institutions in multi-lateral governance of the world economy. The focus is on developing an understanding of central debates in the literature and primary empirical findings from quantitative and cross-national analyses that are of policy relevance.
Prerequisite: GVPT604.
Restriction: Must be in the International Relations Master's program; or permission of Government and Politics department.

GVPT606 Introduction to International Institutions and International Law (3 Credits)
This seminar examines major theoretical approaches and empirical studies of international law and institutions relating to international political economy and international security. Topics to be covered include the sources of international law and the development of core legal principles in the post-WWII ear, the role of international economic institutions such as WTO, IMF, and World Bank in the global economy, and the influence of international institutions such as the UN Security Council, World Court, and International Criminal Court in addressing international security issues. Larger questions about the effectiveness of the WTO, Laws of War, and International Human Rights Law will be considered. The focus is on developing an understanding of central debates in the literature and primary empirical findings from quantitative and cross-national analyses that are of policy relevance.
Prerequisite: GVPT604.
Restriction: Must be in the International Relations Master's program; or permission of Government and Politics department.

GVPT622 Quantitative Methods For Political Science (3 Credits)
Introduction to quantitiative methods of data analysis, with emphasis on statistical methods and computer usage. Measures of association, probability, correlation, linear regression estimation techniques, introductory analysis of variance, and use of package computer programs.

GVPT629 Seminar in Research Design (1 Credit)
This is designed to extend and deepen graduate students understanding of research design in empirical political science. Focus is placed on major issues in planning a research project: developing strong theories, formulating clear hypotheses, and crafting strategies to test theories and rule out rival, alternative explanations. Also, issues of effective communication of research will be considered. To get beyond abstractions, examples of research in American politics will be considered and evaluated. Technical issues of statistical analysis or broader epistemological questions in social science will not be covered.

GVPT700 Scope and Method of Political Science (3 Credits)
Required of all Ph.D. candidates. A seminar in the methodologies of political science, and their respective applications to different research fields. Interdisciplinary approaches and bibliographical techniques are also reviewed.

GVPT702 Geographic Information Systems for Social Science Research (3 Credits)
Introduction to the use of Geographic Information Systems for conducting research in the social sciences. Overview of spatially embedded nature of many social science phenomena and content of theories common to spatial thinking. Students will obtain hands-on experience with various GIS tools and methods most frequently employed by social scientists.
Credit Only Granted for: GVPT368I, GVPT702, or GVPT729D.
Formerly: GVPT729D.

GVPT708 Seminar in International Relations Theory (3 Credits)
An examination of the major approaches, concepts, and theories in the study of world politics with special emphasis on contemporary literature.
Repeatable to: 6 credits if content differs.

GVPT718 Selected Topics in Political Science (3 Credits)
Selected topics in the field of political science.
Repeatable to: 9 credits if content differs.

GVPT722 Advanced Quantitative Methods For Political Science (3 Credits)
Introduction to multivariate analysis. Elementary matrix algebra, multiple linear and curvilinear correlation and regression, analysis of variance, canonical correlation and regression, discriminant analysis, and several types of factor analysis.
Prerequisite: GVPT622; or permission of instructor.

GVPT729 Special Topics in Quantitative Political Analysis (3 Credits)
An intensive examination of special topics in quantitative methods of political analysis in such areas as survey research methods, exploratory data analysis, advanced data management techniques, or advanced methods of policy analysis.
Prerequisite: GVPT622; or permission of instructor.
Repeatable to: 6 credits if content differs.

GVPT742 Modern Political Theory (3 Credits)
The influence of the Enlightenment on political thought, beginning with Machiavelli and ending around the time of Mill and Marx, in which the Enlightenment worked itself out in the hopes and fears of these and other authors.
Recommended: GVPT741.
Restriction: Permission of BSOS-Government & Politics department.

GVPT743 Contemporary Political Theory (3 Credits)
Theorists from Nietzsche (1884-1900) to the present will be covered with a focus on the apparent failure of the Enlightenment to usher in an age of peace and reason.
Restriction: Must have graduate standing.

GVPT761 International Political Economy (3 Credits)
Major issues in international political economy including such matters as the monetary system, trade, debt, and development.
Recommended: GVPT708.

GVPT770 Seminar in American Political Institutions (3 Credits)
This is the core institutions seminar in American politics. The course surveys the primary literature in the field and addresses substantively significant topics related to the study of political institutions in the American context.

GVPT771 Seminar in American Political Behavior (3 Credits)
This is the core seminar in American political behavior. The course will deal with prominent theoretical and empirical issues in the areas of voting, public opinion, political participation and other aspects of political behavior in the American context.

GVPT780 Seminar in the Comparative Study of Politics (3 Credits)
An examination of the salient approaches to and conceptual frameworks for the comparative study of politics, followed by the construction of models and typologies of political systems.

GVPT799 Master's Thesis Research (1-6 Credits)

GVPT803 Seminar in International Political Organization (3 Credits)
An overview and critical analysis of contemporary theory on international organizations and global governance.
Restriction: Must be in Government and Politics PhD program.

GVPT808 Selected Topics in Functional Problems in International Relations (3 Credits)
An examination of the major substantive issues in contemporary international relations.

GVPT828 Selected Problems in Political Behavior (3 Credits)
Individual reading and research reports on selected problems in the study of political behavior.

GVPT831 Formal Theories of Politics I (3 Credits)
Survey of major formal theories of politics, with emphasis on those theories based on the assumptions of rationality. The theory of public goods, game theory, coalition theory, and the theoretical properties of voting systems.

GVPT838 Topics in Formal Political Theory (3 Credits)
An examination of selected topics in formal theory.
Prerequisite: GVPT831; or permission of instructor.

GVPT848 Current Problems in Political Theory (3 Credits)
Intensive examination of the development of political theory since the Second World War.
Prerequisite: GVPT443.

GVPT849 Readings in Government and Politics (3 Credits)
Guided readings and discussions on selected topics in political science.

GVPT859 Selected Topics in Public Policy (3 Credits)
An examination of selected topics in public policy, such as judicial education, health, welfare, and resources policy.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

GVPT868 Problems of State and Local Government (3 Credits)
Report of topics assigned for individual study in the field of state local government throughout the United States.

GVPT869 Seminar in Urban Administration (3 Credits)
Selected topics are examined by the team research method with students responsible for planning, field investigation, and report writing.

GVPT870 Interest Groups Politics in the United States (3 Credits)
The theory and practice of interest group politics in the United States.
Recommended: GVPT770.

GVPT873 Seminar in Legislatures and Legislation (3 Credits)
Reports on topics assigned for individual study and reading about the composition and organization of legislatures and about the legislative process.

GVPT874 Seminar in Political Parties and Politics (3 Credits)
Reports on topics assigned for individual study and reading in the fields of political organization and action.

GVPT877 The Politics of the Presidency (3 Credits)
The major research topics and issues pertaining to the United States presidency.
Recommended: GVPT770.

GVPT878 Problems in American Government and Politics (3 Credits)
An examination of contemporary problems in various fields of government and politics in the United States, with reports on topics assigned for individual study.

GVPT879 Topics on International Security (3 Credits)
A detailed and advanced analysis of particular regional problems on defense policy and arms control.
Recommended: GVPT876.
Repeatable to: 6 credits if content differs.

GVPT884 Field Methods in Comparative Politics (3 Credits)
A practical designed for graduate students interested in field research. Research design, case selection, developing surveys and experiments, analysis of original data, and some qualitative methods will be emphasized, with the aim that students develop the practical skills to conduct their own field research.

GVPT887 Seminar in the Politics of Developing Nations (3 Credits)
An examination of the programs of political development in the emerging nations with special references to the newly independent nations of Asia and Africa, and the less developed countries of Latin America. Individual reporting as assigned.

GVPT888 Selected Topics in Comparative Governmental Institutions (3 Credits)
An examination of special topics in comparative politics.

GVPT889 Selected Topics in Area Problems in International Relations (3 Credits)
Special topics concerning regional problems in the relations of states.

GVPT898 Pre-Candidacy Research (1-8 Credits)
Guided readings and discussions on selected topics in political science.

GVPT899 Doctoral Dissertation Research (1-8 Credits)

HACS - ACES-Cybersecurity

HACS402 Applied Security Analysis and Visualization (3 Credits)
Focuses on exploratory and statistical data analysis, data and information visualization, and the presentation and communication of analysis results. These topics will be presented and explored in the context of and with applications to cybersecurity related data.
Restriction: Must be a student in the ACES (Advanced Cybersecurity Experience for Students) Minor Program.

HACS408 Advanced Seminar in Cybersecurity (3 Credits)
Explores various lenses of cybersecurity in order to promote an interdisciplinary understanding of the field. Although each section may focus on a different topic, each integrates active student engagement, communication, critical communication, critical thinking, and teamwork.
Restriction: Must be a student in the ACES (Advanced Cybersecurity Experience for Students) Minor Program.
Repeatable to: 9 credits if content differs.

HACS479 Undergraduate Research in Cybersecurity (1-3 Credits)
The Advanced Cybersecurity Experience for Students (ACES) program encourages its students to engage in research in order to gain greater insight into a specific area within cybersecurity, obtain an appreciation for the subtleties and difficulties associated with the production of knowledge and fundamental new applications, and to prepare for graduate school and the workforce.
Restriction: Must be a student in the ACES (Advanced Cybersecurity Experience for Students) Minor Program; and permission of UGST-HCOL-ACES Cybersecurity Program.
Repeatable to: 6 credits if content differs.

HACS498 Cybersecurity Group Problem Solving (3 Credits)
The Advanced Cybersecurity Experience for Students (ACES) program encourages its students to engage in team problem solving activities in order to gain greater insight into a specific area within cybersecurity and to obtain an appreciation for the subtleties and difficulties associated with these activities in order to prepare students for graduate school and the workforce. Students engage in a semester long problem solving or development project under the mentorship of a industry specialist and with the guidance of university faculty. Through the exercise the students will develop teamwork experience and professional communication skills in addition to experience of the project itself. The project might be evaluation, creation, testing or analysis of some area of cybersecurity as needed by the mentor-sponsor. A contract of what will be accomplished is required must be agreed upon by the mentor, the student and the ACES leadership before the project can begin.
Restriction: Must be a student in the ACES (Advanced Cybersecurity Experience for Students) Minor Program; and permission of UGST-HCOL-ACES Cybersecurity Program.
Repeatable to: 6 credits.

HEBR - Hebrew

HEBR430 Critical Issues in Israeli Cinema (3 Credits)
Critical investigation of Zionist and Israeli culture and politics through film.Cross-listed with: CINE430.
Credit Only Granted for: HEBR430, CINE430 or FILM430.
Formerly: FILM430.

HEBR498 Special Topics in Hebrew (3 Credits)
Repeatable to: 6 credits if content differs.

HEBR499 Independent Study in Hebrew (1-3 Credits)
Independent study under faculty supervision.
Prerequisite: Permission of instructor.
Repeatable to: 6 credits if content differs.

HESI - Higher Ed, Student Affairs, and International Ed Policy

HESI417 Advanced Leadership Seminar (3 Credits)
Students will analyze and synthesize the concept of leadership using cultural, ethical, sociological, historical perspectives. Exploration and reflection of personal values, decision making, in-depth analysis on various leadership activities. Theories will be emphasized.
Prerequisite: HESI217; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDCP417 or HESI417.

HESI418 Special Topics in Leadership (3 Credits)
The special topics and leadership course will address a single topic related to leadership through the semester. In-depth study and analysis on the topic will be the basis for the course. Topics include gender and leadership, ethics and leadership, and culture and leadership. Leadership will serve as the foundation in the course.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: HESI418 or EDCP418.
Formerly: EDCP418.

HESI470 Introduction to Student Personnel (3 Credits)
A systematic analysis of research and theoretical literature on a variety of major problems in the organization and administration of student personnel services in higher education. Included will be discussion of such topics as the student personnel philosophy in education, counseling services, discipline, housing, student activities, financial aid, health, remedial services, etc.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDCP470 or HESI470.
Formerly: EDCP470.

HESI489 Field Experiences in Higher Education, Student Affairs, and International Education Poli (1-4 Credits)
Planned field experience in education and community related activities. Credit not to be granted for experiences accrued prior to registration.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

HESI498 Special Problems in Higher Education, Student Affairs, and International Education Policy (1-3 Credits)
Available only to HESI students who have formal plans for individual study of approved problems.
Prerequisite: Available only to HISA, HIED, and HIEP students who have formal plans for individual study of approved problems.
Restriction: Permission of EDUC-Counseling, Higher Education and Special Education department.

HESI499 Workshops, Clinics, Institutes (1-6 Credits)
The following type of educational enterprise may be scheduled under this course heading: workshops conducted by the Higher Education, Student Affairs, and International Education Policy program (or developed cooperatively with other departments, colleges and universities) and not otherwise covered in the present course listings.
Repeatable to: 6 credits.

HESI655 Organizational Dimensions of Student Affairs (3 Credits)
Exploration of leadership and organizational change of student affairs programs in post-secondary education.
Prerequisite: EDCP610; or permission of EDUC-Counseling, Higher Education and Special Education department.
Credit Only Granted for: EDCP655 or HESI655.
Formerly: EDCP655.

HESI671 Intergroup Dialogue Facilitation Practicum (3 Credits)
Developing knowledge and skills for facilitating intergroup dialogues. Using the principles and content of intergroup dialogues to create scenarios for the practice of listening, understanding, and taking action under theories of social justice.
Prerequisite: EDCP616 and HESI771; or permission of instructor.
Restriction: Limited to HESI Student Affairs Concentration students only.
Credit Only Granted for: EDCP671 or HESI671.
Formerly: EDCP671.

HESI672 Individual and Organizational Assessment in Student Affairs (3 Credits)
An examination of the scholarship and practice of assessment of college student learning and developmental outcomes as well as organizational practices that contribute to those outcomes.
Credit Only Granted for: EDCP672 or HESI672.
Formerly: EDCP672.

HESI739 Higher Education, Student Affairs, & International Education Policy Study Abroad (1-6 Credits)
An exploration of topics related to higher education, student affairs, & international education policy abroad. Participants engage in tenets associated with University of Maryland Education Abroad programs.
Repeatable to: 9 credits.

HESI771 The College Student (3 Credits)
A demographic study of the characteristics of college students as well as a study of their aspirations, values, and purposes.
Credit Only Granted for: EDCP771 or HESI771.
Formerly: EDCP771.

HESI773 Designing Qualitative Research in Counseling and Student Affairs Contexts (3 Credits)
Introduction to philosophical and epistemological foundations, methodologies and methods associated with qualitative research designs appropriate in student affairs and counseling contexts.
Credit Only Granted for: EDCP773 or HESI773.
Formerly: EDCP773.

HESP - Hearing and Speech Sciences

HESP400 Speech and Language Development in Children (3 Credits)
Analysis of the normal processes of speech and language development in children.
Prerequisite: Minimum grade of C- in HESP300; or permission of BSOS-Hearing & Speech Sciences department.
Recommended: LING200 or HESP120.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP402 Language and Phonological Disorders in Children (3 Credits)
Etiology, assessment and treatment of language and phonological disorders in children.
Prerequisite: Minimum grade of C- in HESP400; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program.

HESP403 Introduction to Phonetic Science (3 Credits)
An introduction to physiological, acoustic and perceptual phonetics; broad and narrow phonetic transcription; current models of speech production and perception.
Prerequisite: Minimum grade of C- in HESP305; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP406 Acquired Neurogenic Communication Disorders in Adults (3 Credits)
Survey of the dysarthrias and aphasias in adults from an interdisciplinary point of view.
Prerequisite: Minimum grade of C- in HESP300 and HESP305; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP407 Bases of Hearing Science (3 Credits)
Fundamentals of hearing, including the physics of sound, anatomy and physiology of peripheral and central auditory nervous system, psychophysical procedures used in measurement of auditory sensation and perception, and topics in psychological acoustics.
Prerequisite: Minimum grade of C- in HESP311; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP411 Introduction to Audiology (3 Credits)
An introduction to the field of audiology. Evaluation and remediation of hearing handicaps.
Prerequisite: Minimum grade of C- in HESP311; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP413 Aural Rehabilitation/Habilitation (3 Credits)
The fundamental aspects of aural rehabilitation therapy for both adults and children are introduced to students. Class time will consist of lectures, discussions, and hands-on activities.
Prerequisite: HESP411.
Restriction: Sophomore standing or higher.

HESP415 Principles and Methods in Speech-Language Pathology (2 Credits)
The principles and methods required to provide treatment of speech and language disorders to children and adults. Topics include writing goals and objectives, programming,teaching strategies,session design, data collection, behavior modification and counseling.
Prerequisite: HESP400.
Restriction: Must be in Hearing and Speech Sciences program.

HESP416 Principles and Methods in Audiology (2 Credits)
Relate previous knowledge of anatomy/physiology and pathologies of the auditory system and integrate this information into clinical application.
Prerequisite: Minimum grade of C- in HESP411.
Restriction: Must be in Hearing and Speech Sciences program; and permission of BSOS-Hearing & Speech Sciences department.

HESP417 Principles and Methods in Speech-Language Pathology and Audiology (3 Credits)
The principles underlying the treatment of speech, language and hearing disorders in children and adults.
Prerequisite: HESP400 and HESP411; or permission of BSOS-Hearing & Speech Sciences department.
Restriction: Must be in Hearing and Speech Sciences program; or permission of BSOS-Hearing & Speech Sciences department.

HESP418 Clinical Practice in Speech-Language Pathology and Audiology (3 Credits)
Supervised observation with some direct participation in clinical methods for the treatment of disorders of articulation, fluency, child and adult language; evaluation and habilitation/rehabilitation of hearing impaired children and adults.
Prerequisite: Minimum grade of C- in HESP417.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits.

HESP422 Neurological Bases of Human Communication (3 Credits)
Basic neurology as it pertains to anatomy and physiology substrates of speech and language.
Prerequisite: HESP305; or permission of instructor.
Credit Only Granted for: HESP498 or HESP422.

HESP468 Professional Development in Research and Academia (1 Credit)
The purpose of this seminar is to complement your honors project with practical advice on how to navigate successful careers in research and academia. As you progress through your undergraduate years (especially if you work in a lab), you will likely make several unofficial observations about life as a graduate student, postdoc, or professor, and overhear conversations that include new terminology that may be confusing (e.g., research mentorship, grants, conference abstract, tenure). This can create a mysterious aura around what it is like to obtain your PhD and work in academia generally. In this class, we will cover tips and skills that are often passed along informally in the lab; but here, we will discuss these issues overtly from a range of perspectives, experiences, and best practices.
Restriction: Must be in the Hearing and Speech Sciences Honors program; or permission of Hearing and Speech Sciences department.
Repeatable to: 3 credits if content differs.
Additional Information: This course would be taken for three semesters.

HESP469 Honor Thesis Research (1-3 Credits)
Student will develop thesis proposal, conduct research, analyze results, develop and defend final written document.
Prerequisite: Permission of honors thesis advisor required.
Repeatable to: 6 credits if content differs.

HESP498 Seminar (3 Credits)
Selected topics in human communication and its disorders.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP499 Independent Study (1-3 Credits)
A directed study of selected topics pertaining to human communication and its disorders.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP600 Instrumentation in Hearing and Speech Sciences (3 Credits)
Types and principles of operation of electronic equipment used in the hearing and speech sciences.
Restriction: Must be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP601 Foundations of Scientific Inquiry (1 Credit)
Overview of methods of empirical research used in Communication Sciences and Disorders. The course will focus on identifying, critically analyzing, and writing about empirical research.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of Instructor.
Additional Information: Course meets over three semesters for the duration of the Masters of Speech-Language Pathology program.

HESP602 Advanced Seminar in Neurological Bases of Communication (2 Credits)
An advanced discussion of the neural bases of human communication and its disorders, neuroimaging, neural plasticity and neurological evaluations, with emphasis on current developments and critical analysis.
Prerequisite: An undergraduate course in human neuroanatomy.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.

HESP603 Seminar in Cultural and Linguistic Diversity in Communication Disorders (1 Credit)
Overview of cultural and linguistic diversity (CLD) in general, and the impact of CLD on communication, communication disorders, and the professional practice of Speech-Language Pathology
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of Instructor.
Additional Information: Course meets over four semesters for the duration of the Masters of Speech-Language Pathology program.

HESP605 Assessment & Intervention in Bilingual Populations (3 Credits)
Integrates foundational knowledge pertaining to bilingualism in speech-language pathology. This course provides students with a framework for working with individuals from culturally and linguistically diverse backgrounds. This course is designed to educate and train student clinicians to serve as bilingual speech-language pathologists.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program.

HESP606 Basic Hearing Measurements (3 Credits)
Theoretical principles, methodology, and interpretation of routine audiometric tests, including pure tone, speech, and acoustic immittance measures. Modification of procedures for special populations. Equipment calibration and mass hearing screening programs.
Prerequisite: HESP411; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP610 Language Disorders in Adults (2 Credits)
Etiology, diagnosis and management of language problems of adults associated with aging, brain injury and degenerative conditions.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of instructor.

HESP611 Cognitive Disorders in Adults (2 Credits)
Etiology, diagnosis and management of cognitive problems of adults associated with aging, brain injury and degenerative conditions.
Prerequisite: Must have completed or be concurrently enrolled in HESP610; and must have knowledge of basic human neuroanatomy.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of instructor.

HESP612 Fluency Disorders (2 Credits)
The nature of fluency disorders. Principles, methods and procedures for the clinical management of fluency disorders in children and adults.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP613 Autism Spectrum Disorders (2 Credits)
Etiology, diagnosis and management of autism spectrum disorders.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of instructor.
Credit Only Granted for: HESP639A or HESP613.
Formerly: HESP639A.

HESP615 Counseling in Communicative Disorders (3 Credits)
Introduction to the application of counseling principles and methodologies for working with individuals with communication disorders and their families. The role of the audiologist and speech language pathologist as counselors will be explored. Class content will focus on theoretical approaches and techniques to counseling from the fields of psychology, social work, and family the family therapy. The application of counseling in the diagnostic process as well as treatment of a wide variety of communication disorders will be highlighted throughout the course.
Recommended: HESP400 and HESP411.

HESP616 Language Disorders in the Pre-school Age (2 Credits)
Theoretical, empirical and clinical perspectives on language disorders in children from infancy through pre-school age.
Prerequisite: HESP400; or students who have taken courses with comparable content may contact the department.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP617 Cultural and Linguistic Diversity in Communication and its Disorders (2 Credits)
An exploration and discussion of cultural and linguistic diversity, its impact on communication and communication disorders, and strategies for assessment and intervention of culturally and linguistically diverse clients
Recommended: HESP417 or equivalent.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)).

HESP620 Speech Production Disorders Across the Lifespan (3 Credits)
Assessment and treatment of phonological, articulatory and resonance disorders arising from various etiologies including developmental conditions, structural abnormalities, and nervous system damage.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; or permission of instructor.

HESP621 Bilingualism in Children and Adults (3 Credits)
Provides an overview of topics related to bilingualism in both pediatric and adult populations, with an emphasis on application in the field of communication disorders. This course explores theories of bilingual language acquisition, typical and atypical bilingual development, cognition in bilinguals, and the neurological underpinnings of bilingualism. This course will provide practicing clinicians with foundational knowledge related to bilingualism in both pediatric and adult populations. Currently there are no existing courses that provide this content with a focus on communication disorders.

HESP622 Neuromotor Disorders of Speech (3 Credits)
Effects of neuropathology on speech production. Classification and assessment of the resultant disorders and their treatment.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP623 Education, Policy & Advocacy in Bilingual Service Delivery (3 Credits)
Bilingual education and associated policy issues in the US as they relate to the field of speech-language pathology. Topics include bilingual education models, disproportionality, and the legal framework related to bilingual service delivery in education settings.

HESP624 Voice Disorders (2 Credits)
Etiological characteristics, assessment and treatment of phonatory disorders in children and adults.
Restriction: Permission of BSOS-Hearing & Speech Sciences department; or must be in Hearing and Speech Sciences: M.A. (Master's) program.

HESP625 Dysphagia (3 Credits)
Nature and clinical management of dysphagia as it pertains to different clinical settings for adult and pediatric populations.
Restriction: Permission of BSOS-Hearing & Speech Sciences department; or must be in Hearing and Speech Sciences: M.A. (Master's) program.

HESP626 Language disorders in school-aged children and adolescents (2 Credits)
Etiology, assessment and treatment of communication and learning problems in school age children and adolescents

HESP627 Augmentative and Alternative Communication (2 Credits)
Principles, methods, and procedures for categorizing, understanding, and developing augmentative and alternative communication.
Recommended: Prior knowledge of Communication and its Disorders is required.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Credit Only Granted for: HESP639R or HESP627.

HESP630 Electrophysiological Measurements (3 Credits)
Principles and techniques of physiological and electrophysiological measures of the audio-vestibular mechanisms.
Prerequisite: HESP606.
Restriction: Must be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP632 Medical Audiology (3 Credits)
Overview of auditory pathologies, and their assessment and management in the medical setting.
Prerequisite: HESP311.
Corequisite: HESP606.

HESP634 Anatomy and Physiology of the Auditory and Vestibular Systems (3 Credits)
Comprehensive examination of the anatomy and physiology of the peripheral as well as the central auditory and vestibular systems. Both afferent and efferent pathways will be considered. Applications of basic auditory neuroscience to contemporary clinical audiology practice will be highlighted.
Prerequisite: Must have completed or be concurrently enrolled in HESP311, HESP407, and HESP411; or permission of instructor.
Additional Information: Fills a requirement for the Doctoral Program in Clinical Audiology (CAUD). Open to students in other graduate programs, especially NACS.

HESP635 Aural Rehabilitation/Habilitation (3 Credits)
Principles, methods and procedures for aural rehabilitation/habilitation in children and adults.

HESP636 Geriatric Audiology (3 Credits)
Research findings are presented on the physical effects of aging on the auditory periphery and central nervous system, as well as the consequences of aging on behavioral and electrophysiologic measures of auditory function. Clinical implications in the effects of physiologic and cognitive aging on auditory performance will be discussed.
Prerequisite: HESP606 and HESP700.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)).

HESP638 Research Practicum (1-3 Credits)
Analysis, synthesis and integration of knowledge related to current research or clinical issues in human communication and its related disorders.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP639 Special Topics in Hearing and Speech Sciences (1-3 Credits)
Intensive coverage of selected topics of current interest.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP645 Pediatric Audiology (3 Credits)
Evaluation and treatement of hearing-impaired children.
Prerequisite: HESP606.
Restriction: Must be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP646 Educational Audiology (3 Credits)
Examination of historical and current trends influencing educational programming for hearing-impaired children, communication options for severely and profound hearing-impaired children, and the role of the audiologist in the educational setting.
Prerequisite: HESP606.
Recommended: HESP645.

HESP648 Clinical Practice in Speech (1-3 Credits)
Supervised training in the application of clinical methods in the diagnosis and treatment of speech disorders.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP648A Clinical Practice in Speech: Diagnostic Procedures (1-3 Credits)
Supervised training in the application of clinical methods in the diagnosis of speech disorders.
Restriction: Permission of instructor.

HESP648B Clinical Practice in Speech: Therapeutic Procedures (1-3 Credits)
Supervised training in the application of clinical methods in the treatment of speech disorders.
Prerequisite: HESP648A.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP649 Clinical Practice in Audiology (1-3 Credits)
Supervised training in the application of clinical methods in the diagnosis and treatment of hearing disorders.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP649A Clinical Practice in Audiology: Diagnostic Procedures (1-3 Credits)
Supervised training in the application of clinical methods in the diagnosis of hearing disorders.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP649B Clinical Practice in Audiology - Aural Rehabilitation (1 Credit)
A clinical practicum course with individualized instruction, which focuses on the skills necessary to provide intervention and counseling for a wide range of disorders of the auditory system in patients of varying ages and cultural backgrounds. Each student will be various activities across three semesters (Spring YR2, Summer YR2, and Fall YR3). Students may work individually or in pairs to provide hearing loss intervention, auditory training, hearing loss prevention education, and communication strategy training. The student is expected to prepare for each session with a complete clinical plan, educational materials, and counseling strategies. Students must meet with the Audiologist prior to the aural rehabilitation (AR) session to discuss the plan of care. During the visit, the student will perform hearing loss handicap assessments, lead counseling sessions regarding rehabilitative options, make modifications to existing treatment plans/hearing aids, and educate the patient about their hearing. Following the visit, the student will document the encounter according to clinical protocol and ethical standards using the electronic medical records system. All patient-related information will be handled within a secure computer environment which meets HIPAA regulations for protected health information.
Prerequisite: HESP649A.

HESP658 Special Clinical Topics in Hearing and Speech (1-3 Credits)
Comprehensive coverage of selected topics pertinent to clinical issues. Specific content varies each semester, and may include supervision, clinical ethics, etc.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP700 Hearing Aids (3 Credits)
Principles, methods and procedures for selection, fitting, calibration and management of amplification systems for hearing-impaired children and adults.

HESP701 Hearing Aids II (3 Credits)
Advanced issues in amplification technology, prescriptive hearing aid selection, and management of amplification systems for special populations.
Prerequisite: HESP700.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP702 Diagnostic Procedures in Speech-Language Pathology (2 Credits)
Diagnostic tools and methods in the analysis of speech-language disorders in children and adults.
Restriction: Must be in Hearing and Speech Sciences: M.A. (Master's) program; and permission of BSOS-Hearing & Speech Sciences department. Or permission of instructor.

HESP704 Audiology Practice Management (3 Credits)
Basics of clinical business management both in the context of private practice in Audiology and as a department in a healthcare corporation.
Prerequisite: HESP606, HESP706, HESP700, and HESP701; or permission of instructor.

HESP706 Advanced Clinical Audiology (3 Credits)
Advanced clinical and experimental methods of evaluating the peripheral and central auditory system using acoustic stimuli. Procedural considerations and interpretation of test results.
Prerequisite: HESP606; or students who have taken courses with comparable content may contact the department.

HESP708 Independent Study (1-6 Credits)
Individual research projects under guidance of a faculty member.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP710 Industrial and Environmental Noise Problems (3 Credits)
Evaluation and control of noise hazards. Effects of noise on man. Medico-legal aspects of noise-induced hearing impairment.
Restriction: Permission of instructor.

HESP712 Cochlear Implants and Other Implantable Technologies (3 Credits)
Comprehensive presentation of cochlear implant design and processing, medical/surgical aspects, evaluation, programming, outcomes in children and adults, and post stimulation care. The role of the audiologist as a member of the cochlear implant team will be emphasized. Current and emerging trends in other implantable technologies also will be covered.
Prerequisite: Must have completed or be concurrently enrolled in HESP700, HESP701, and HESP722; or permission of instructor.

HESP722 Psychoacoustics (3 Credits)
Auditory perception and auditory processing in normal and impaired hearing.

HESP724 Research Design (3 Credits)
Evaluations of research designs, critique of published articles and student involvement in designing experiments on assigned topics.
Prerequisite: Must have completed a course in basic statistics.

HESP728 Advanced Clinical Practice in Speech (1-8 Credits)
Clinical internship in selected off-campus facilities.
Prerequisite: HESP648.
Restriction: Permission of instructor.
Repeatable to: 8 credits.

HESP729 Advanced Clinical Practice in Audiology (1-8 Credits)
Clinical internship in selected off-campus facilities.
Prerequisite: HESP649.
Restriction: Permission of instructor.
Repeatable to: 8 credits.

HESP730 Vestibular-ocular Assessment and Management (Electrophysiologic Measures II) (3 Credits)
Advanced principles and methods of evaluating vestibular-ocular function using electrophysiologic measures. Includes rehabilitative issues pertaining to balance disorders and advanced electrophysiologic measures of auditory system function.
Prerequisite: HESP630.

HESP731 Seminar in Clinical Supervision (1 Credit)
Supervising students and employees can be a daunting task. Fostering the next generation of doctors of audiology and support staff requires a unique set of knowledge and skills. This course is designed to explore the theoretical concepts in the supervisory paradigm as well as real-world scenarios. Supervision is not a "one-size fits-all" process, therefore the intricacies and strategies of the supervisor-supervisee relationship must be carefully considered.
Prerequisite: In at least the third year in AuD program.

HESP788 Graduate Research Externship (1-3 Credits)
Off-campus research internship with departmental affiliates at National Institutes of Health and other regional universities. Contact department chairman for available placements, requirements and openings.
Recommended: HESP724.

HESP799 Master's Thesis Research (1-6 Credits)

HESP808 Current Research in Hearing, Speech and Language Services (1-3 Credits)
Current research in speech, language and hearing sciences and disorders.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP818 Seminar in Language Processing (3 Credits)
Information processing models of language, relationships among language, memory and cognition.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP828 Seminar in Hearing Science (3 Credits)
Recent developments in auditory psychophysics, and/or anatomy and physiology of the periperal and central auditory mechanisms.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 6 credits if content differs.

HESP829 Clinical Internship Residency (1-9 Credits)
Off-Campus, full-time (30-40 hours/week) clinical externship in Audiology at regional and national institutions.
Prerequisite: Must have completed HESP729 for two semesters; and must have completed the comprehensive exams successfully.
Restriction: Permission of BSOS-Hearing & Speech Sciences department.
Repeatable to: 18 credits if content differs.

HESP838 Seminar in Language Acquisition (3 Credits)
Models of normal and disordered first language acquisition, second language acquisition and bilingualism.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP848 Seminar in Audiology (3 Credits)
Research tipics realted to hearing assissment, amplification, and audiologic rehabilitation.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP849 Capstone Research Project I (2 Credits)
First of two-course sequence leading to the final research requirement for the Doctor of Audiology (Au.D.) degree; involves individual study and/or supervised lab work with mentor, preparation of research proposal (including IRB protocol if required), and attendance at Capstone Research Project Workshop.
Prerequisite: HESP724.
Restriction: Must not be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program.

HESP858 Seminar in Speech Pathology (3 Credits)
Problems in disordered articulation, voice, fluency and dysphagia.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP859 Capstone Research Project II (1-2 Credits)
Second of two-course sequence leading to the final research requirement for the Doctor of Audiology (Au.D.) degree; involves final data collection, analysis and presentation of results or completion of scholarly paper under the direction of the faculty mentor.
Prerequisite: Must have completed or be concurrently enrolled in HESP849.
Restriction: Must be in Clinical Audiology: Au.D. or Ph.D. (Doctoral) program.

HESP868 Seminar in Speech Science (3 Credits)
Problems in speech acoustics and physiology.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP878 Seminar in Language Disorders (3 Credits)
Congenital and acquired language disorders of children and adults.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HESP879 Academic Research Seminar (1 Credit)
An overview of issues relevent to the research process will be provided.Topics rotate on a semester basis and include ethics, grantsmanship, professional presentations, research publications, and peer review of journal articles. A formal product (e.g., poster presentation, platform presentation, peer review, IRB application) will be required each semester.
Restriction: Must be in Hearing and Speech Sciences: Ph.D. (Doctoral) program.
Repeatable to: 3 credits if content differs.

HESP887 Academic Research Seminar (2 Credits)
This course has a focused, rotating set of topics each semester to cover professional and academic issues, including ethics, grantsmanship, professional presentations, professional publications, and peer review of journal articles.
Prerequisite: HESP724.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral)).

HESP888 Seminar in Neurological Bases of Language (3 Credits)
Neural ststrates of language function, brain image of normal and disordered language function, and neural plasticity for language.
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral); Hearing and Speech Sciences: M.A. (Master's)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP889 Doctoral Candidacy Research (1-3 Credits)
Doctoral candidacy paper research
Restriction: Must be in one of the following programs (Hearing and Speech Sciences: Ph.D. (Doctoral); Clinical Audiology: Au.D. or Ph.D. (Doctoral)) ; and permission of instructor.
Repeatable to: 6 credits if content differs.

HESP898 Pre-Candidacy Research (1-8 Credits)

HESP899 Doctoral Dissertation Research (1-8 Credits)

HISP - Historic Preservation

HISP600 History, Theory, and Practice of Historic Preservation (3 Credits)
An introduction to history, theory and practice of historic preservation covered through readings, discussions, presentations, class projects, and field trips.
Prerequisite: Permission of ARCH-Historic Preservation Program.

HISP611 Historical Research Methods (3 Credits)
Research methods used by professional historic preservationists to identify and record historic structures and sites. Emphasizes inter/multidisciplinary nature of contemporary preservation practice using archival and ethnographic evidence as a basis for establishing significance.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP610 or HISP611.

HISP615 The Everyday and the "American" Environment (3 Credits)
An introduction into the theories of the everyday with the context of the American built environment. The course focuses primarily on the American experience of underrepresented, minority, and immigrant communities; both historical and contemporary. The course attempts to challenge what is meant by American in describing the American every day built environment.
Prerequisite: Permission of ARCH-Historic Preservation Program. Also offered as: HISP200.
Credit Only Granted for: HISP615, HISP619E, or HISP200.
Formerly: HISP619E.

HISP619 Special Topics in Historic Preservation (1-6 Credits)
Technical aspects of preservation taught by practitioners whose expertise are of special benefit to certificate students.
Repeatable to: 12 credits if content differs.

HISP628 Selected Topics in Historic Preservation (3 Credits)
Critical issues in contemporary preservation practice will be examined. Topics will change each year, according to the professor's interests and the relevance of the course topic, and will include such themes as: preservation of the everyday built environment, social and ethnic dimensions of historic preservation practice, and preservation of Modern architecture and landscapes. The course will consist of readings, class, discussions, and a substantial individual research project.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

HISP629 Independent Studies in Historic Preservation (1-3 Credits)
Individual Instruction course.
Restriction: Permission of ARCH-Historic Preservation Program.

HISP630 Preservation Policy and Planning (3 Credits)
An opportunity is provided to look in depth at the national historic preservation program that is the federal, tribal, state, and local (city and county) public sector preservation activities being undertaken in accordance with public policy set by laws, regulations, standards, and guidelines.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP619M or HISP630.
Formerly: HISP619M.

HISP635 Social and Ethnic Issues in Historic Preservation Practice (3 Credits)
This seminar course examines the broader social and ethnic dimensions of historic preservation practice that have impacted the field since the "culture wars" of the 1990's. Through weekly case studies of local, international sites, students will explore these issues and apply newly emerging methodologies to their final case study project.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP628E or HISP635.
Formerly: HISP628E.

HISP640 Historic Preservation Law, Advocacy and Public Policy (3 Credits)
Introduce students to legal, advocacy, and public policy issues in the field of historic preservation. Student activities will be designed to teach basic working knowledge of relevant legal subjects, including historic preservation ordinances, state and federal preservation statutes, and important constitutional issues.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP619C or HISP640.
Formerly: HISP619C.

HISP645 Archaeology and Preservation (3 Credits)
An introduction to issues related to archaeological resources and preservation. Topics will include method and theory in American archaeology, archaeology in support of architectural history, archaeology and the NHPA, archaeological site preservation and conservation, and curation and collections management. Students will have a chance to work at an archaeological site to experience field excavation techniques and challenges, and will visit other archaeological sites and curation facilities in the area.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP619A or HISP645.
Formerly: HISP619A.

HISP650 Historic Preservation Studio Workshop (6 Credits)
Students carry out a group preservation project in a local community, from inception and problem formulation through completion. Guided carefully by a faculty team, students will conduct research, interact with communities, perform analyses, and propose solutions for an issue or problem of direct relevance to a local community and client group.
Prerequisite: HISP600; and permission of ARCH-Historic Preservation Program.
Restriction: Must be in a major in ARCH-Historic Preservation Program.

HISP655 American Vernacular Architecture (4 Credits)
History, theory, and practice of American vernacular architecture including a review of common building technologies, structure, and style, and focusing on methods and approaches for recording, documenting and analyzing these historic resources.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP655 or HISP619V.
Formerly: HISP619V.

HISP660 Internship in Historic Preservation (3 Credits)
Students will secure a summer internship with an organization engaged in historic preservation work (this can be a public agency, nonprofit, or private firm). The students will formulate a plan of work and a series of pedagogical goals to satisfy both the practical needs of the project and the academic requirements for the course.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Formerly: HISP619.

HISP670 Conservation of Historic Places: Historic Materials, Building Systems, and Conservation (3 Credits)
Introduces students to the analysis of historic buildings, building systems and materials. The overall emphasis is on assessing the condition of a building and its parts, and formulating a preservation strategy based on it. Conservation methods will be discussed through the introduction of philosophies and specific techniques.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP619T or HISP670.
Formerly: HISP619T.

HISP678 Fieldwork in Historic Preservation (3 Credits)
Advanced fieldwork in research and documentation of historic sites and structures including primary local history research, building analysis, survey techniques, field photography, and graphic documentation techniques.
Repeatable to: 6 credits if content differs.

HISP679 Introduction to Measured Drawings for Historic Preservation (3 Credits)
Teaches graphic documentation methodologies for historic buildings, including hand measuring, drafting, preparing a sketch plan, analyzing buildings, and producing finished drawings in ink. Students will analyze building in situ.
Repeatable to: 6 credits if content differs.

HISP680 Preservation Economics (3 Credits)
Students are introduced to a range of economic theories, methods, and issues that must be considered in the practice of historic preservation. Case studies related to community economic development, adaptive reuse, tax credit programs, project finance, and land use will be presented.
Prerequisite: Permission of ARCH-Historic Preservation Program.
Credit Only Granted for: HISP619N or HISP680.
Formerly: HISP619N.

HISP690 Historic Preservation Professional Practice (2 Credits)
Students explore management and practice issues in the historic preservation field. Topics include: project management, budgeting, personnel, and grantsmanship. Each topic will be considered in the three main areas of practice - government agencies, non-profits, and for profit companies. Outside speakers from these various practice environments will present on their area of specialization.
Restriction: Permission of instructor.

HISP701 Certificate Portfolio Project (1 Credit)
Students will gather samples of their work and craft a synthetic statement on their experiences in their HISP certificate courses (for example, picking up on themes such as community involvement, diversity of practice, affordable housing, or sustainability), and the ways in which they have integrated historic preservation into their thinking and practice in their home discipline.
Prerequisite: Permission of ARCH-Historic Preservation Program.

HISP710 Final Project in Historic Preservation I (1 Credit)
An independent, applied research project investigating the preservation of a particular site or a specialized issue in historic preservation. This is part one of a two-semester sequence and involves developing the project proposal and bibliography.
Credit Only Granted for: HISP700 or HISP710.
Formerly: HISP700.

HISP711 Final Project in Historic Preservation II (2 Credits)
An independent, applied research project invesitgating the preservation of a particular site or a specialized issue in historic preservation. This is part two of a two semester sequence and involves project research and writing.
Credit Only Granted for: HISP700 or HISP711.
Formerly: HISP700.

HIST - History

HIST401 Science and Gender (3 Credits)
Examines the role of women and gender in the history of science. Includes consideration of barriers to women's participation in science; women's role as scientific subjects and researchers; and questions about the scientific construction of gender and the gendered construction of science.
Credit Only Granted for: HIST401 or HIST429R.
Formerly: HIST429R.

HIST404 History of Modern Biology (3 Credits)
The internal development of biology in the 19th and 20th centuries, including evolution, cell theory, heredity and development, spontaneous generation, and mechanism-vitalism controversies. The philosophical aspects of the development of scientific knowledge and the interaction of biology with chemistry and physics.

HIST405 Environmental History (3 Credits)
An introduction to the key issues and methods of environmental history. The scope of the subject is discussed, as well as its relationship with other disciplines, such as ecology, anthropology, and geography. A primary focus is environmental change in history with emphasis on the American experience.

HIST407 Technology and Social Change in History (3 Credits)
Social consequences of technological innovations and the ways in which societies have coped with new technologies.

HIST408 Senior Seminar (3 Credits)
A capstone course for history majors, designed to increase historical knowledge and the ability to analyze texts and arguments. Topics will focus on the literature of a particular field and primary-source research.
Restriction: Must be in History program.
Repeatable to: 6 credits if content differs.

HIST412 History of Women and Gender in Africa (3 Credits)
An examination of socio-economic and cultural change in Africa from the dawn of the colonial era in the 19th century to independence in the mid-twentieth century. Major focus on how African women understood and responded to the expansion of European empires, changes in the colonial economy, and impact of westernization and urbanization.
Prerequisite: HIST122 or HIST123; or permission of ARHU-History department.
Credit Only Granted for: HIST412 or HIST428L.
Formerly: HIST428L.

HIST415 Ideas and Politics in Europe Since 1900 (3 Credits)
Examination of intersection of ideas and politics in Europe since 1900. Focus will be on advocates of liberalism, social democracy, fascism, Nazism, communism, and conservatism and their impact on politics and policy since 1900.

HIST416 History of Slavery and the Slave Trade in Africa (3 Credits)
Examines the history and impact of the slave trade on African states, societies, and economies. Investigates the meaning of slavery in Africa, the local uses of slavery there and Africa's connections to the Trans-Saharan, Red Sea, and Trans-Atlantic slave trades.
Credit Only Granted for: HIST416 or HIST419Y.
Formerly: HIST419Y.

HIST417 Colonial Encounters: Natives, Spaniards, and Africans in the New World (3 Credits)
An exploration of the discourses and practices of the Spanish colonial project in the New World and the ways in which Indians and Blacks were incorporated into or excluded from that project. Also examines native and African resistance and adaptation to Spanish rule, and the process of transformation and hybridization of Spanish, native and African cultures in Spanish America. An analysis of recent historiographical developments that have profoundly changed the understanding of the Spanish conquest and colonization of the New World.
Recommended: HIST220 and HIST250.
Credit Only Granted for: HIST417 or HIST428Y.
Formerly: HIST428Y.

HIST418 Jews and Judaism: Selected Historical Topics (3 Credits)
Prerequisite: HIST281, HIST283, HIST106, HIST286, or HIST282; or permission of instructor.
Repeatable to: 6 credits if content differs.

HIST419 Special Topics in History (3 Credits)
Repeatable to: 9 credits if content differs.

HIST419Q Before the Holocaust: The Golden Age of Eastern European Jewry (3 Credits)
An exploration of the history of the Jews of Eastern Europe from the period of the Polish Lithuanian Commonwealth until the Holocaust. Topics to be covered include religious, political, social, and cultural transformation of Jewish life in Eastern Europe in the context of the general political changes in the area.Cross-listed with: JWST370.
Credit Only Granted for: JWST419E, JWST370, or HIST419Q.
Formerly: JWST419E.

HIST421 Medieval Heresies (3 Credits)
An examination of twelfth- and thirteenth-century heresies in the medieval West. Consideration of why so many heretics emerged, and how the church attempted to deal with them, and what effect their persecution had on Europe both then and later. Special attention given to groups that stood on the fine line between heresy and orthodox religion.
Credit Only Granted for: HIST408L or HIST421.
Formerly: HIST408L.

HIST425 Imperial Russia (3 Credits)
The rise and fall of the Russian Empire, Peter the Great to the collapse of tsarism in revolution. Emphasis on the evolution of autocracy, social groups, national identities, and cultural change.

HIST427 Age of Decline: Britain 1914 to Present (3 Credits)
British society since the First World War. The social, cultural, economic, and political impact of the First World War; labor and politics in the 1920s and 1930s; the inter-war Depression, appeasement and foreign policy; the social impact of the Second World War; the welfare state and nationalization of industry; the dissolution of Empire; the emergence of a consumer society; social criticism in the 1950s; the economic and political problems of the 1960s and 1970s.

HIST428 Selected Topics in History (3 Credits)
Repeatable to: 9 credits.

HIST429 Special Topics in History (3 Credits)
Repeatable to: 9 credits.

HIST429X Tradition and Change: Jewish Religion in the Modern World (3 Credits)
An exploration of the history of the different modern Jewish religious movements that developed in Europe, starting with messianic movements and ending with Reform and Orthodoxy. Emphasis will be placed on the influence of the academic study of Judaism on the development of modern Jewish religious ideologies and practices.Cross-listed with: JWST347, RELS347.
Credit Only Granted for: RELS347, JWST347, HIST429X, or RELS419R.
Formerly: RELS419R.

HIST430 Reformations in Politics, Religion, and Gender: England 1485-1603 (3 Credits)
An examination of the political, religious, and social forces in English life, 1485-1603, with special emphasis on Tudor government, the English reformation, and the Elizabethan era.

HIST431 Becoming Great Britain, 1603-1704 (3 Credits)
An examination of the political, religious, and social forces in English life, 1603-1714, with special emphasis on Puritanism and the English revolutions.

HIST433 Strategic Military Theory: Clausewitz (3 Credits)
An exploration of Clausewitzian thought. Topics include the conduct of fighting and war planning, the relationship of war and politics, guerrilla war, the principles of concentration of force, the Clausewitzian trinity, absolute war and real war, unlimited and limited war, the relative strengths of the defense and the attack, and the intuitive sources of strategic decision.
Credit Only Granted for: HIST419J or HIST433.
Formerly: HIST419J.

HIST436 Napoleon, the French Revolution and the World (3 Credits)
An argument for the broad continuity between the revolutionary and Napoleonic wars.

HIST437 Modern France from Napoleon to DeGaulle (3 Credits)
The changing political and cultural values of French society in response to recurrent crises throughout the 19th and 20th centuries. Students should have had some previous survey of either Western civilization or European history.

HIST441 Germany Since 1900 (3 Credits)
Course places Nazism in context of German and European history. Topics include collapse of German democracy and the establishment of the Nazi dictatorship; the role of Hitler; the response of political, military, economic, diplomatic, legal, media, theological elites and the broader population; the mix of terror, consent and coercion; propaganda and Nazi culture; contours of Nazi racial ideology and anti-Semitism and their impact on domestic and foreign racial policy; the economic history of the Nazi regime; foreign policy from rearmament to launching World War II to expansion and defeat; Jewish policy from the years of persecution to those of extermination; Nazi policy in Eastern and Western Europe, towards the United States, and towards North Africa and the Middle East; why the Allies won World War II and why and how Nazi Germany was defeated; the nature of the Allied occupation after 1945; the Nuremberg war crime trials; aftermath of facing and avoiding the crimes of the Nazi regime in West and East Germany.

HIST442 Twentieth-Century Russia (3 Credits)
Russia and the Soviet Union from the fall of the tsars to the post-communist present. Impact of Leninism, Stalinism, and Soviet Communism on state, society, culture, and nationality.

HIST446 Old Regime France, 1589-1789 (3 Credits)
An exploration of the demographic patterns of the seventeenth and eighteenth centuries. Examination of arguments that the population was governed by Malthusian constraints; the social structure of the time; the nature of the elites; the debate over the phrase "rise of the bourgeoisie"; the Enlightenment both as an intellectual phenomenon and as a social agent; and arguments that Enlightenment led to the desacralization of the monarchy.
Credit Only Granted for: HIST419I or HIST446.
Formerly: HIST419I.

HIST447 Riot, Law and Justice in European History (3 Credits)
An examination of the role of violence and the attempt of law to contain or punish it. Major interpretations of societal codes of honor, retribution, and punishment, and how violence is governed by these codes.
Credit Only Granted for: HIST428C or HIST447.
Formerly: HIST428C.

HIST450 American Capitalism: 1600-1900 (3 Credits)
This course explores the transformation of economic life in what became the United States from pre-colonial times to 1900, with special emphasis on economic interactions among Native American, Mexican, and European societies; how and why capitalism took root and became dominant; economic dimensions of the Revolutionary and Civil Wars; why the North, South, and West followed distinct economic paths; the revolutions in transportation and communications; slavery as a business system; causes and consequences of industrialization; and trends in the distribution of wealth and income.
Prerequisite: HIST200, HIST210, HIST213, HIST222, HIST254, HIST275, or HIST311; or permission of instructor.

HIST451 American Capitalism: 1900 to Present (3 Credits)
An examination of the evolution of American capitalism from 1900 to the present, with special attention on the emergence of the United States as the world's leading economic power; the impact of big business on work and government regulation; causes and consequences of the Great Depression; the role of business in the two world wars; postwar growth followed by the decline of U.S. global competitiveness; why consumerism occupied a central role in U.S. history; the influence of economic theory on policymaking; realities and mythologies of Reaganomics and Clintonomics; and the economic impact of the digital revolution.
Prerequisite: HIST201, HIST211, HIST213, HIST222, HIST255, or HIST275; or permission of instructor.

HIST452 Diplomatic History of the United States to 1914 (3 Credits)
American foreign relations from the American Revolution to the beginning of World War I. International developments and domestic influences that contributed to American expansion in world affairs. Analyses of significant individuals active in American diplomacy and foreign policy.

HIST453 Diplomatic History of the United States from 1914 (3 Credits)
American foreign relations in the 20th century. World War I, the Great Depression, World War II, the Cold War, the Korean War, and Vietnam. A continuation of HIST452.

HIST454 Constitutional History of the United States: From Colonial Origins to 1865 (3 Credits)
The interaction of government, law, and politics in the constitutional system. The nature and purpose of constitutions and constitutionalism; the relationship between the constitution and social forces and influences, the way in which constitutional principles, rules, ideas, and institutions affect events and are in turn affected by events. The origins of American politics and constitutionalism through the Constitutional Convention of 1787. Major constitutional problems such as the origins of judicial review, democratization of government, slavery in the territories, secession, and civil war.

HIST455 Constitutional History of the United States: Since 1865 (3 Credits)
American public law and government, with emphasis on the interaction of government, law, and politics, and the relationship between the constitution and social forces and influences, the way in which constitutional principles, rules, ideas, and institutions affect events and are in turn affected by events. Major crises in American government and politics such as Reconstruction,the rise of corporate power, civil liberties during wartime, the New Deal era, the civil disorders of the 1960s.

HIST457 History of American Culture and Ideas Since 1865 (3 Credits)
A continuation of HIST456, from the Civil War to the present.
Prerequisite: HIST201, HIST211, HIST213, HIST222, HIST255, or HIST275; or must have completed HIST157; or permission of instructor.

HIST459 Society in America: Historical Topics (3 Credits)
A consideration of selected aspects of American society from colonial times to the present. Special emphasis on regionalism, immigration, nativism, minorities, urbanization, and social responses to technological changes.
Repeatable to: 6 credits if content differs.

HIST460 History of Labor in the United States (3 Credits)
The American working class in terms of its composition; its myths and utopias; its social conditions; and its impact on American institutions.
Prerequisite: HIST200, HIST201, HIST210, HIST211, HIST222, HIST255, or HIST275; or must have completed HIST156 or HIST157; or permission of instructor.

HIST462 Slavery, Sectionalism, and the U.S. Civil War (3 Credits)
Slavery, sectionalism, and the coming of the Civil War. Resources and strategy of the Confederacy and the Union, the war's changing character, emancipation and its consequences, conditions on the home front, and the wartime origins of Reconstruction.

HIST463 History of the Old South (3 Credits)
The golden age of the Chesapeake, the institution of slavery, the frontier South, the antebellum plantation society, the development of regional identity, and the experiment in independence.

HIST466 Immigration and Ethnicity in the U.S. (3 Credits)
Seminar exploring historical problems relating to US immigration, race, and ethnicity since 1848, with emphasis on cultural impacts of migration on immigrants, their children, and U.S. society.
Prerequisite: AAST200, AAST201, AAST222, HIST200, HIST201, HIST221, or HIST222; or must have completed HIST156 or HIST157; or permission of ARHU-History department.
Credit Only Granted for: AAST498L or HIST466.

HIST467 Women and Reform Movements in the Twentieth-Century United States (3 Credits)
Investigation of women's participation in such twentieth-century reform movements as the labor movement, the struggle for racial justice, social welfare reform, and women's movements. Will ask how race, class, and gender were implicated in the ways that women agitated for social political change.
Recommended: HIST201, HIST211, or HIST255.
Credit Only Granted for: HIST467 or HIST429E.
Formerly: HIST429E.

HIST469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

HIST473 History of the Caribbean (3 Credits)
Offers a concise introduction to the history of the Caribbean regions from the Columbian voyages to the 20th century. Special emphasis is given to the dynamics of local social and cultural formations within the framework of the political and economic history of the Atlantic world.
Prerequisite: HIST112, HIST113, HIST122, HIST123, HIST240, HIST250, or HIST251.

HIST476 Jews in Medieval Times 1000-1450 (3 Credits)
Social and cultural life of Jewish communities spread throughout Islam and Christendom. Major topics include the Gaonate, kehila organizations, legal, rationalist, and mystical thought, and the context of rising animosity against Jews linked to the Crusades and changing Church doctrines.
Recommended: HIST282, HIST330, HIST331, or JWST234. Cross-listed with J WST432.
Credit Only Granted for: HIST476 or JWST432.

HIST477 Transnational Blackness in the Americas (3 Credits)
The African diaspora is a concept that attempts to comprehend the shared experiences of African-descended peoples throughout the world, particularly in the Americas. While many of these peoples identify with a particular nationality (being Brazilian, Cuban, or from the United States above or alongside being black, of color, or of African descent), many of them have forged connections with each other across national boundaries and recognized commonalities that transcend their national contexts. This class will use fiction, memoir, and recent historical scholarship to explore the history of the links that Afro-Latin American and Afro-North Americans have created in the nineteenth and twentieth centuries. Ultimately, the course will help us understand the historical possibilities and limitations of conceiving of African Americans as a hemispheric, transnational social group.

HIST481 A History of Modern China (3 Credits)
Modern China from 1644 to the People's Republic of China. Emphasis on the coming of the West to China and the various stages of the Chinese reaction.

HIST482 History of Japan to 1800 (3 Credits)
Traditional Japanese civilization from the age of Shinto mythology and introduction of continental learning down to the rule of military families, the transition to a money economy, and the creation of a townsmen's culture. A survey of political, economic, religious, and cultural history.

HIST483 History of Japan Since 1800 (3 Credits)
Japan's renewed contact with the Western world and emergence as a modern state, industrial society, and world power, 1800-1931; and Japan's road to war, occupation, and recovery, 1931 to the present.

HIST484 Cultural History of the Chinese Revolutions (3 Credits)
Examines the cultural origins, experience, and results of the Cultural Revolution in China.
Recommended: HIST481 or HIST285.
Credit Only Granted for: HIST419G or HIST484.
Formerly: HIST419G.

HIST486 Social Issues in Modern China (3 Credits)
Explores the problems surrounding family, community, and social life in modern China, including a focus on issues that affect groups and subcultures within the population. Examines as well the political system's capacity to regulate this complex society.
Recommended: HIST285; and HIST481.
Credit Only Granted for: HIST419N (Fall2007) or HIST486.
Formerly: HIST419N.

HIST491 History of the Ottoman Empire (3 Credits)
Survey of the Ottoman Turkish Empire from 1300 A.D. to its collapse during World War I. Emphasis on the empire's social and political institutions and its expansion into Europe, the Arab East and North Africa.

HIST492 Women and Society in the Middle East (3 Credits)
Examines the customs, values and institutions that have shaped women's experience in the Middle East in the past and in the contemporary Middle East.
Recommended: Prior coursework in Middle East studies or gender studies. Cross-listed with: WGSS456.
Credit Only Granted for: HIST492, WMST456 or WGSS456.
Formerly: WMST456.

HIST495 Women in Medieval Culture and Society (3 Credits)
Medieval women's identity and cultural roles: the condition, rank and rights of medieval women; their access to power; a study of women's writings and the constraints of social constructs upon the female authorial voice; and contemporary assumptions about women.Cross-listed with: WGSS455.
Credit Only Granted for: HIST495, WMST455 or WGSS455.
Formerly: WMST455.

HIST499 Independent Study (1-3 Credits)
Restriction: Permission of ARHU-History department.
Repeatable to: 6 credits.

HIST601 History and Contemporary Theory (3 Credits)
An introduction to contemporary theories in philosophy, literary criticism, cultural studies, anthropology, and other fields; and analysis of their usefulness to historians.

HIST607 The Teaching of History in Institutions of Higher Learning (1 Credit)

HIST608 General Seminar (3 Credits)
General seminar in student's major field of study (e.g., U.S.; Women and Gender; International, World, and Comparative; Science and Technology; Latin America) exploring the concentration's major issues, topics, and literature.
Restriction: Permission of ARHU-History department.
Repeatable to: 9 credits if content differs.

HIST609 Readings in the History of Science and Technology (3 Credits)

HIST610 Introduction to Museum Scholarship (3 Credits)
Provides students a basic understanding of museums as cultural and intellectual institutions. Topics include the historical development of museums, museums as resources for scholarly study, and the museum exhibition as medium for presentation of scholarship.Cross-listed with ANTH655, AMST655.
Credit Only Granted for: AMST655, ANTH655, or HIST610.

HIST618 Readings in Women's and Gender History (3 Credits)

HIST619 Special Topics in History (1-3 Credits)

HIST628 Readings in Colonial American History to 1763 (3 Credits)
Major historical literature on various groups and developments in the European colonies that later became the United States through the period ending with the British-French "Great War for Empire."

HIST629 Readings in the American Revolution and New Nation, 1763 to 1812 (3 Credits)

HIST638 Special Topics in History (3 Credits)
Special Topics in History.
Repeatable to: 9 credits if content differs.

HIST639 Special Topics in History (3 Credits)
Special Topics in History.
Repeatable to: 9 credits if content differs.

HIST648 Readings in Early 20th-Century America, 1900-1941 (3 Credits)
Major historical literature on various groups and developments in the United States between the Progressive Era and the beginning of World War II.

HIST649 Readings in Recent American History, 1941-Present (3 Credits)
Key subjects, themes, and historiographic debates in the history of the United States from 1941 to the present.

HIST658 Readings in American Constitutional and Legal History (3 Credits)
Historical literature on the American constitutional order from the colonial foundations to the present. The founding and development of political and constitutional institutions examined from the perspectives of law, politics, government and political philosophy.

HIST659 Readings in American Cultural and Intellectual History (3 Credits)
Major historical literature pertinent to the cultural/intellectual development of the varied peoples of the United States.

HIST668 Readings in American Social History (3 Credits)
Major historical literature related to specific issues in the social history of the United States.

HIST669 Readings in U.S. Economic and Business History (3 Credits)
An overview of U.S. economic and business history and historiography from colonial times to the present. Emphasizes the methodologies of "new" economic historians and institutional business historians, the evolving role of the state in the American economy, and cultural dimensions of economic change.
Repeatable to: 6 credits.

HIST678 Readings in American Labor History (3 Credits)
Major historical literature related to the development of the American working class, the labor movement, and gender/racial/ethnic issue within them.

HIST679 Readings in the History of American Foreign Policy (3 Credits)
Major historical literature related to the diplomacy and international relations of the United States.

HIST689 Readings in Southern History (3 Credits)
Major historical literature centered on the development and peoples of the southern United States.

HIST698 Professional Internship (3 Credits)
Internship with a professional organization in the historical disciplines or related fields.
Restriction: Must be in one of the following programs (History (Master's); History (Doctoral)).
Repeatable to: 6 credits if content differs.

HIST708 Directed Independent Reading for Comprehensive Examinations I (1-4 Credits)
Directed reading in preparation for Doctoral Comprehensive Examinations. In consultation with their advisors, students will select a number of books and articles from an approved list. Grading for the course will reflect performance on the written and oral sections of the Comprehensive Examinations.
Restriction: Permission of ARHU-History department.
Repeatable to: 12 credits if content differs.

HIST709 Directed Independent Reading for Comprehensive Examinations II (1-4 Credits)
Directed reading in preparation for Doctoral Comprehensive Examinations. In consultation with their advisors, students will select a number of books and articles from an approved list. Grading for the course will reflect performance on the written and oral sections of the Comprehensive Examinations.
Repeatable to: 12 credits if content differs.

HIST711 Final Project in Historic Preservation II (2 Credits)
An independent, applied research project investigating the preservation of a particular site or a specialized issue in historic preservation. This is part two of a two-semester sequence and involves project research and writing.
Credit Only Granted for: HISP700 or HISP711.
Formerly: HISP700.

HIST718 Readings in Medieval History (3 Credits)

HIST719 Readings in the History of the Renaissance and Reformation (3 Credits)

HIST720 Readings in the History of the Catholic Church (3 Credits)
This is graduate-level readings seminar in the modern history of the Catholic Church. We will begin with the Reformation and proceed through the present day. This course will combine European history with global history, looking both at how the Church changed in the face of major turning points in modern European history (the Scientific, French, and Russian Revolutions; the two world wars; and the Cold War) and at its missionary encounters and long-term presence across the world (in Latin America, India, China, Africa, and North America).

HIST729 Readings in Modern European History (3 Credits)
Reading knowledge of some European language recommended but not required.

HIST739 Readings in the History of Great Britain (3 Credits)

HIST748 Readings in Modern French History (3 Credits)

HIST749 Readings in German History, 1815 to the Present (3 Credits)
Reading knowledge of German is encouraged, but not required.
Repeatable to: 9 credits if content differs.

HIST758 Readings in Eastern European History (3 Credits)
Selected topics in the history of the Hapsburg monarchy and the successor states, Poland and the Balkans. Emphasis on the rise of nationalism during the 19th century and the experience with fascism and communism in the 20th century.
Repeatable to: 6 credits if content differs.

HIST759 Readings in Russian and Soviet History (3 Credits)

HIST768 Readings in Chinese History (3 Credits)

HIST778 Readings in Latin American History (3 Credits)

HIST779 Readings in Middle Eastern History (3 Credits)

HIST789 Readings in Modern European Intellectual History (3 Credits)

HIST798 Readings in Jewish History (3 Credits)
Readings on selected topics in Jewish history. Emphasis on analysis of primary sources. Reading knowledge of Hebrew recommended.
Repeatable to: 6 credits.

HIST799 Master's Thesis Research (1-6 Credits)

HIST808 Seminar in the History of Science and Technology (3 Credits)

HIST809 Seminar in the History of Women and Gender (3 Credits)
Repeatable to: 9 credits if content differs.

HIST810 Museum Research Seminar (3 Credits)
A research seminar focusing on the practice and presentation of cultural and historical scholarship in museums and historical sites. Students will complete an original research project on the challenges and opportunities of public exhibition and interpretation of cultural and historical research.
Prerequisite: AMST655, ANTH655, or HIST610. Cross-listed with ANTH856, AMST856.
Credit Only Granted for: AMST856, ANTH856, or HIST810.

HIST811 Museum Scholarship Practicum (3-6 Credits)
Students devise and carry out a research program using the collections at the Smithsonian Institution or some other cooperating museum, working under joint supervision of a museum professional and a university faculty member.
Prerequisite: AMST856, ANTH856, or HIST810.
Restriction: Permission of Museum Scholarship Program required. Cross-listed with ANTH857, AMST857.
Credit Only Granted for: AMST857, ANTH857, or HIST811.

HIST819 Special Topics in History: Independent Research (1-3 Credits)
Individual graduate research in an area not covered by current seminar offerings. The product will be a finished research paper normally based on original materials.
Restriction: Must be in History program; and permission of ARHU-History department.
Repeatable to: 6 credits if content differs.

HIST829 Seminar in Latin American History (3 Credits)

HIST838 Seminar in Ancient History (3 Credits)
Restriction: Permission of instructor.
Repeatable to: 6 credits.

HIST839 Seminar in Medieval and Early Modern European History (3 Credits)

HIST848 Seminar in Modern European History (3 Credits)

HIST849 Seminar in Russian and Soviet History (3 Credits)

HIST869 Seminar in Recent American History (3 Credits)

HIST878 Seminar in Colonial American History (3 Credits)

HIST879 Seminar in the American Revolution and Formative Period (3 Credits)

HIST880 Seminar in Southern History (3 Credits)

HIST888 Seminar in the Middle Period and Civil War (3 Credits)

HIST898 Pre-Candidacy Research (1-8 Credits)

HIST899 Doctoral Dissertation Research (1-8 Credits)

HLHP - Health and Human Performance

HLHP615 Crises of Aging: Time, Retirement and Widowhood (3 Credits)
A cross-disciplinary and multidisciplinary investigation of phenomena which comprise a significant portion of the issues confronting an older adult's life: (1) introduction to multiple processes of adulthood and aging; (2) the concepts and meaning of time; (3) pre-retirement and retirement adjustments; and (4) loss and widowhood.
Formerly: PERH615.

HLHP625 Issues in Retirement: Theory and Practice (3 Credits)
Multidisciplinary examination of retirement phenomena, including theories of transition, government and private sector policies, social expectations, physical correlates, personal adjustments, and economic consequences. Emphasis upon research utilization.
Formerly: PERH625.

HLHP688 Field Work in Aging (1-6 Credits)
Sequences of supervised field experience in the field of aging, including direct service, administration, research, or training. Emphasis on career exploration and assessment in relation to the field of aging.
Prerequisite: Permission of SPHL-School of Public Health.
Formerly: PERH688.

HLHP689 Selected Problems in Health, Physical Education and Recreation (1-6 Credits)
Research projects in special areas in health, physical education and/or recreation which have interdisciplinary implications not covered in structured courses.
Formerly: PERH689.

HLHP780 Interdisciplinary Issues in Aging (3 Credits)
Multidisciplinary approaches to the processes of aging to achieve a more holistic understanding. Pedagogical research dissemination, peer instruction, guest lecturing, and informal discussion. The demonstration of the multilateral nature of growing older. Discussion of cross-disciplinary and interdisciplinary research proposals.
Formerly: PERH780.

HLMN - Hillman Entrepreneurs Program

HLSA - Health Services Administration

HLSA465 Redesigning Mental Health Services (3 Credits)
Students will use Design Thinking to create, reshape, redesign and transform the ways in which mental health and wellness is perceived and addressed on the campus. This course will incorporate students and the UMD community as stakeholders in designing, planning and contributing to developing solutions that leverage existing mental health resources or create new pathways to improve mental health and wellness at UMD. Students will learn and use design thinking skills to enhance public health practice skills in project proposals and grant writing.
Prerequisite: HLTH366.
Recommended: EPIB301.

HLSA484 Redesigning Health Care: Developing a Clinic to Meet Community Needs (3 Credits)
Provides an opportunity for students to learn a key entrepreneurial skill, Design Thinking, while helping to build, reshape, redesign and transform delivery of health care in the Mona Center, a new community center and clinic in Prince George's County. This new, modern vision for a health and wellness clinic embraces student involvement in designing, planning and contributing to innovative programs, solutions, and processes to improve the clinic's ability to meet community and patient needs by addressing the social determinants of health as well as traditional clinical health status. Students in the class will develop empathy for patients, providers and other stakeholders, define problems, select a specific problem for intervention, understand problems based on stakeholder input, ideate, reframe and suggest options to solve or address the problem, prototype solutions, test ideas, and make recommendations to inform implementation and ongoing measurement and monitoring of impact.
Restriction: Must have completed a minimum of 60 credits.
Additional Information: Two sessions will be on-site at the Mona Clinic in Temple Hills, MD, and the remaining sessions will be taught in the University of Maryland's Academy for Innovation and Entrepreneurship.

HLSA601 Introduction to Health Systems (3 Credits)
Management and leadership skills for effective public health planning, organization, management and administration. Emphasis is on the role of institutions in learning and behavioral change process, organizational theory, administration management, and coordinating provision of community health services.

HLSA611 Introduction to Health Equity (3 Credits)
The emerging field of health equity is concerned with understanding the causes and consequences of social disparities in population health. This course is designed to expose students to the foundational issues in health equity from a variety of perspectives. Through weekly meetings and discussion, students will develop familiarity with the major literature in the field of health equity. The course is divided into three sections: (1) Understanding Addressing Health Disparities; (2) Disparity Populations; and (3) Solutions in Health Equity. Students will gain understanding of the dimensions and sources of health inequality, including race/ethnicity, socioeconomic status, gender, nativity, and sexual minority status. Current policy debates and recent policy developments related to health equity are also briefly discussed.

HLSA688 Independent Study (1-6 Credits)
Master or doctoral students who desire to pursue special research problems under the direction of a faculty memeber of the department may register for 1-6 hours of credit under this number.
Prerequisite: Permission of SPHL-Health Services Administration department.
Repeatable to: 9 credits if content differs.

HLSA689 Field Work in Aging (1-6 Credits)
Individual instruction course.
Prerequisite: Permission of SPHL-Health Services Administration department.
Repeatable to: 6 credits if content differs.
Formerly: SPHL688.

HLSA702 Policy and Politics of Health (3 Credits)
Organizational and financial components of the U.S. health care system, including social and political forces that bind the system. Advanced political analysis of the health care system, including key issues and problems.

HLSA703 Seminar in Health Equity (1 Credit)
Student-led presentations and discussion of contemporary literature in the areas of health disparities and health equity, social determinants, (eg. race, ethnicity, sex, age, sexual identity, disability, socioeconomic status, and geographic location) and policies and programs to address disparities. The emphasis is on papers describing new research findings, novel techniques, innovative methods, and emerging issues.

HLSA709 Graduate Seminar (1 Credit)
The purpose of the course is for doctoral students to present their work to fellow doctoral students and faculty in an informal and supportive environment. Faculty and students provide feedback and suggestions that are helpful to the presenting students. Several sessions each semester are for external speakers on interesting research topics.
Prerequisite: HLSA doctoral students.
Restriction: Must be HLSA doctoral student.
Repeatable to: 6 credits if content differs.

HLSA710 Healthcare Management: Foundations and Principles (3 Credits)
Concepts and managerial activities essential to achieve the goals of health care organizations are examined and discussed. Managerial processes include planning, decision-making, etc. required to operate and change health care organizations will be discussed. Special emphasis will be placed on the leader/managers role in developing and maintaining an effective system for providing healthcare.

HLSA711 Health Economics and Analysis (3 Credits)
Provides an analysis of health and health care services as economic goods. Using microeconomic theories, we will examine the behavior of health care providers, consumers, markets, and firms.

HLSA713 Seminar in Health Policy (1 Credit)
Student-led presentations of contemporary literature in the areas of health policy, health care reform in the nation and Maryland, and evaluation of health policies and programs. Emphasis on papers describing new research findings, novel techniques, innovative methods, and emerging issues.

HLSA714 Economic Evaluation of Medical Care (3 Credits)
An overview of the theory and applications of cost-benefit analysis, cost-effectiveness analysis, and related forms of economic evaluation/ decision analysis in the health care sector.
Prerequisite: HLSA601 and SPHL602; or students who have taken courses with comparable content may contact the department.

HLSA720 Health Law and Ethics (3 Credits)
The legal system helps determine the relationships prevailing among individuals, institutions and governments by setting out the rights, duties and powers of the various parties. This course will look at some of the more important concepts the law uses within the context of health services and public health.

HLSA721 Using Demographic Data for Health Policy Analysis (3 Credits)
The goal of this course is to introduce students to the major demographic data sets that are used in health policy research and to provide hands-on experience using these data to answer policy oriented research questions
Prerequisite: SPHL602; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Additional Information: Priority enrollment will be given to students in the Department of Health Services Administration programs.

HLSA723 Health Policy Analysis and Advocacy (3 Credits)
Examination of the politics of the health policy process, including the effects of American political structure and institutions; economic and social factors; interest groups, classes, and social movements; media and public opinion, and other factors. The emphasis is both on understanding how public policy is made as well as how to influence the process.Students will learn about (1) how health policy is developed, adopted, and implemented, (2) the political, institutional, economic, social, and other factors that influence and shape the process, and (3) the basic approaches and tools of strategic advocacy.
Prerequisite: HLSA601.

HLSA724 Developing and Implementing Health Policy in Maryland (3 Credits)
Provides students with a thorough overview of Marylands health care policymaking process, including critical analysis of legislative, regulatory, financing, and delivery factors that shape health care policy. Examination of major current and ongoing health care policy issues in the state of Maryland. Students will be given the opportunity to receive briefings from key stakeholders who will offer their insights into complex and controversial health care policy issues in Maryland.
Prerequisite: Must have completed or be concurrently enrolled in HLSA601.

HLSA725 Econometrics in Public Health (3 Credits)
Empirical course to introduce students to econometric methods and their applications in public health.
Prerequisite: SPHL602; or students who have taken courses with comparable content may contact the department.
Additional Information: priority enrollment will be given to students at the School of Public Health.

HLSA727 Causal Inference in Health Services Research (3 Credits)
An overview of the conceptual and empirical tools used to infer causation in health and health care research. Advantages and limitations of experimental and quasi-experimental designs in health services research are discussed and students gain experience through applied exercises.
Prerequisite: HLSA725 or permission of instructor.

HLSA730 Healthcare Human Resources (3 Credits)
Provides an introduction to the management of human resources in the healthcare setting using basic human resources management doctrine common to all industries. Content includes principles and methods of personnel including employment, recruitment, selection, retention, training and development, compensation including wage and salary administration performance appraisal, job analysis and labor relations.

HLSA733 Topics in Health Care Reform (3 Credits)
An overview of the Patient Protection and Affordable Care Act of 2010 (ACA) and the major health care reforms explicitly included in the law, while also considering the state implementation decisions and provider innovation that has occurred over time due to the ACA is provided. It will address issues of implementation of Medicaid expansion, the state and federal Exchange, costs of care and efficiency, improving quality and patient safety as well as prevention and public health. We will discuss the actual process of passing the law, what compromises were made, the funding sources, recent changes, regulations, state decisions, waivers, and demonstration or pilot programs that have been developed and/or funded due to the law. We will also focus on the implementation of the law in Maryland, where the legislature and governor decided to expand Medicaid and create a state-based insurance exchange. However, the impacts of the law could be different in Maryland than in other states due to the population, moderate politics, and the presence of state price setting authority for hospitals and other providers.
Prerequisite: HLSA601, HLSA702, or HLSA711.

HLSA740 Healthcare Strategic Planning and Marketing (3 Credits)
An understanding of strategic management and marketing is provided which enables the students to lead the process of strategic planning in a healthcare organization. By conducting a marketing and strategic planning process, health care organizations are better able to cope with dramatic changes in technological, social, political, regulatory, and competitive aspects of the health care market. Strategic management enables organizations to identify issues unique to them, which hinder or promote organizational success. Through course readings, class discussions, analyses of secondary quantitative and qualitative data, and presentation of case studies, students gain a thorough understanding of the strategic management process. Students will apply core competencies through a comprehensive strategic and marketing plan. Plans will be defended through an oral presentation.

HLSA745 Public Health Practice and Management (3 Credits)
Examines the relationship of practice and management in performing essential public health services on local, state and national levels.

HLSA750 Healthcare Management Information Systems (3 Credits)
Provides a background and overview of the analysis, design, evaluation, selection, installation, use, and mangement of information systems in health care settings. Students will review the information management function and value of information and the role of information technology in the provision of high quality care and management decision making. Details on computer hardware, software, networking, and telecommunications sufficient for understanding of concepts relevant to health care managers and staff will be addressed.

HLSA760 Healthcare Financial Management (3 Credits)
Offers content in health services financial management with emphasis on applying traditional financial theories to health care and the health care system. Focus on decision-making using accounting and finance theories, principles, concepts and techniqes most important to health care leaders.

HLSA765 Dissertation Proposal Development Seminar (3 Credits)
Designed to support doctoral students prepare their dissertation proposal and oral presentation. The course is structured around a literature synthesis and development of a modified AHRQ R36 grant application which includes developing a research question and hypotheses, a conceptual model, specific aims, background and significance, and research strategy. The importance of communicating complex ideas through oral and written forms will be emphasized.
Recommended: Completed all coursework related to one's dissertation topic; and identified in collaboration with one's dissertation advisor a topic area and potential data set.
Restriction: Must be in Health Services Ph.D. (Doctoral) program; or permission of instructor. And must have passed departmental qualifying exam.

HLSA766 Foundational Readings in Health Services Research (3 Credits)
An overview of the foundational papers that inform health services research and its related disciplines; including literature on key conceptual models, classic empirical studies, and research illustrating cutting edge methods or findings. The major theoretical frameworks and empirical challenges of the field will be examined through critical reading and discussion among students. The course is organized around preparation for the qualifying exam in the Health Services Ph.D. program.
Prerequisite: Completion of the six HLSA Health Services Research core courses.
Restriction: Must be in Health Services Ph.D. (Doctoral) program.

HLSA770 Continuous Quality Improvement in Healthcare (3 Credits)
Designed for the health care professional or administrator involved in quality assurance in health care. Course includes historical beginnings, state-of-the-art, voluntary, governmental efforts, and tools to promote quality assurance.

HLSA772 Healthcare Leadership and Communications (3 Credits)
Health care administrators rely on transformational leadership skills and insights to help their organizations rise to the social financial, public health, and technological challenges of the future. Students will assess and develop their leadership strengths, apply key leadership communication principles, and critically analyze relevent leadership models, exploring their utility in addressing key leadership issues in health care organizations. An underlying theme will be the identification of core values involved in health care delivery, integration of those values in personal and organizational missions, and effective communication to stakeholders.

HLSA775 Public Health Research (3 Credits)
Provides an interdisciplinary approach to gaining an understanding of and acquiring the skills to conduct public health research. This course covers policy and social issues, theory, and methods of evaluation and participatory research, from simple community based health programs to large-scale interventions. The course emphasizes experimental and quasi-experimental designs to estimate program impact as well as evaluation of program implementation. Case studies drawn from the public health field illustrate various types of evaluations and participatory research initiatives. Lectures, interactive discussions, group projects, individual projects and related assignments.
Prerequisite: EPIB650.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA777 Program Evaluation Field Experience (3 Credits)
Program evaluation is a critical component in designing and operating effective programs. Organizations seek more accountability for the funds they provide to public or private projects. This course serves as an introduction to assessment methodology and evaluation tools commonly used in program evaluation. Students will gain practical experience through a series of exercises involving the design of a conceptual framework, development of indicators, and development of an evaluation plan to measure impact, and cost benefit/cost effectiveness analysis. The course will cover mixed methods research including qualitative and quantitative analysis, methodologies, and/or paradigms in a research study. Students will evaluate a community health program funded by the Maryland Community Health Care Commission (CHRC), and the Commission director will guide selection of the program.
Additional Information: Students will travel to the program site approximately three times to guide the evaluation design and collect data.

HLSA778 Internship in Public Health (1-4 Credits)
Internship providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Prerequisite: Permission of SPHL-Health Services Administration department.
Repeatable to: 4 credits.
Credit Only Granted for: HLSA785 or HLSA778.

HLSA780 Qualitative Methods for Health Services Research (3 Credits)
Qualitative research is a multi-methods approach to the study of social interactions in natural settings. Through triangulation of methods, the researcher attempts to make sense of, or interpret, phenomema in terms of the meanings people bring to them.

HLSA785 Internship in Public Health (3 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Prerequisite: Permission of SPHL-Health Services Administration department.
Credit Only Granted for: HLSA785 or HLSA778.

HLSA786 Capstone Project in Public Health (3 Credits)
Capstone experience provding opportunity to apply knowledge and skills to a specific public health problem or issue. Completion of project relevant to public health under the direction of an advisor.
Prerequisite: Permission of SPHL-Health Services Administration department.

HLSA787 Minority Health and Health Equity (3 Credits)
A critical analysis of historical, political, economic, social, cultural, and environmental conditions that have produced an inequitable health status for racial and ethnic minorities in the United States.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA788 Critical Readings in Health Services Research (3 Credits)
Current and classic readings and research on various aspects of the health services research including the health care system, health care policy and social science research on health (including economics, psychology, political science, sociology etc.). The readings will be critically analyzed and applied to students research and current research as well as applications to health services research issues.
Repeatable to: 9 credits if content differs.

HLSA790 Advanced Methods in Health Services Research (3 Credits)
Provides an in-depth examination of health services research literature with emphasis on methodological scrutiny and application of methods beyond linear regression such as categorical regression, survival analysis, selection issues, and endogeniety.
Prerequisite: SPHL602; or permission of instructor.

HLSA791 Advanced Research Seminar II (3 Credits)
Introduces pre-candidates at the end of their coursework to methods for locating, downloading and processing secondary data sources with complex survey design. The course emphasizes analysis of the Medical Expenditure Panel Survey (MEPS) data with Stata statistical software. The analysis and synthesis skills acquired throughout the students' doctoral coursework are applied to write and conduct analysis for a publishable journal article.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA792 Health Services Portfolio Seminar I (3 Credits)
Assists doctoral pre-candidates at the end of their coursework with completing the required research portfolio requirements.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA793 Health Services Portfolio Seminar II (3 Credits)
Introduces students to the main sections of a publishable paper. This is an applied course so students are expected to learn how to critique a research article and how to write a publishable one. By the end of this course, each student is expected to have written a publishable paper with a formal abstract, specific to their research topic.
Restriction: Must be in a major in SPHL-School of Public Health; or permission of instructor.

HLSA798 HLSA Journal Club (1 Credit)
The course will highlight current topics in health services research. Outside speakers will present their research in a few of the classes. For the other classes, graduate students in the HLSA programs will select important and timely articles that they will present to the class for discussion in an informal setting.
Restriction: Must be HLSA graduate student.
Repeatable to: 8 credits if content differs.

HLSA799 Master's Thesis Research (1-6 Credits)

HLSA898 Pre-Candidacy Research (1-8 Credits)

HLSA899 Doctoral Dissertation Research (1-8 Credits)

HLTH - Health

HLTH410 Honors Seminar (3 Credits)
Undergraduate majors with a strong academic record are provided the opportunity to engage in challenging educational experiences related to the social and behavioral aspects of public health. Students will learn the skills and knowledge to develop, propose, defend, and complete an honors thesis or honors project.
Prerequisite: HLTH200; and must have completed 2 other courses in HLTH.
Restriction: Minimum cumulative GPA of 3.5; and must have completed 45 credits before applying.

HLTH420 Effective Strategies for Public Health Practice (3 Credits)
The purpose of this course is to present the interrelationships of curriculum planning, methodology and the selection and use of successful public health presentation strategies. Special problems associated with public health presentations are discussed, and students become familiar with a variety of resources as well as with planning for and implementing demonstration presentations.
Prerequisite: Minimum grade of C- in EPIB301, EPIB315, SPHL100, HLTH124, HLTH140, HLTH200, HLTH230, HLTH302, BSCI170, BSCI171, and BSCI201. Students must have successfully completed or concurrently complete HLTH364.
Corequisite: HLTH490 and HLTH391.
Restriction: Must be in a major within the SPHL-Behavioral and Community Health department.

HLTH424 Lesbian, Gay, Bisexual & Transgender Health (3 Credits)
The preparation of students to be knowledgeable advocates for the health of lesbian, gay, bisexual, and transgender (LGBT) populations. Course focus is defined by the Healthy People 2020 federal health objectives for LGBT populations: data collection for research, culturally competent healthcare, bullying in schools, suicide, homelessness, and sexually transmitted diseases including HIV.
Recommended: Students should have some familiarity with basic psychology, sociology and/or epidemiology.
Restriction: This course is restricted to students who have completed a minimum of 60 credits. Jointly offered with HLTH624.
Credit Only Granted for: HLTH424 or HLTH6 24.

HLTH430 Health Education in the Workplace (3 Credits)
A survey of the role of health education in work settings. Examination of occupational stress, the health effects of shift work, women's health in the workplace, health education approaches to informing workers and management, and health promotion programs in the workplace.

HLTH431 Health Literacy in Action (3 Credits)
This course introduces the concept of health literacy and develops the knowledge and skills to understand the field and engage productively about health literacy with healthcare providers, systems, and policy makers. The class explores diverse perspectives about health information and communication, and different pathways and strategies to help create the conditions for more informed and engaged individuals and communities.
Recommended: HLTH 371; or equivalent.
Repeatable to: 0 credit.
Credit Only Granted for: HLTH431 or HLTH498L.
Formerly: HLTH498L.

HLTH432 Medical Terminology (3 Credits)
Provides the framework for understanding medical language and terminology used by health care professionals. Students will gain an understanding of the rules of building and analyzing medical terms from word origins and will learn correct pronunciation, definitions, and spelling for all of the body systems, major pathological conditions, common disorders, prescribed medications, and more. Whether a student is interested in learning more about the medical field or they want to acquire practical knowledge for future personal use, this course provides the foundation for understanding the language of medicine.
Credit Only Granted for: HLTH432 or HLTH498T.
Formerly: HLTH498T.

HLTH434 Introduction to Public Health Informatics (3 Credits)
Provides an overview of the field of public health informatics and the influence of technology on the public's health and well-being. Emphasizes the application of various technologies and computer/internet applications to support public health research and practice, including strategies to address new and emerging threats.
Restriction: Must be in one of the following programs (Community Health; Public Health Science) ; and must have earned a minimum of 60 credits.
Credit Only Granted for: HLTH434 or HLTH498E.
Formerly: HLTH498E.

HLTH460 Multicultural Population Health (3 Credits)
Health concerns of U.S. ethnic minority groups and factors placing them at elevated risk for disease and injury. Health education concepts and strategies to reduce disparities between their health status and the health status of the general population.
Prerequisite: HLTH140, HLTH230, or HLTH366; or permission of SPHL-Behavioral & Community Health department.
Restriction: Must be in a major within the SPHL-Behavioral & Community Health department.

HLTH471 Women's Health (3 Credits)
The women's health movement from the perspective of consumerism and feminism. The physician-patient relationship in the gynecological and other medical settings. The gynecological exam, gynecological problems, contraception, abortion, pregnancy, breast and cervical cancer and surgical procedures. Psychological aspects of gynecological concerns.
Restriction: Must be in a program in the Harriet Tubman Department of Women, Gender, and Sexuality Studies; or must be in a major within SPHL-Behavioral & Community Health department. Cross-listed with: WGSS471.
Credit Only Granted for: HLTH471, WMST471, or WGSS471..
Formerly: WMST471.

HLTH476 Death Education (3 Credits)
Examination of the genesis and development of present day death attitudes and behavior by use of a multidisciplinary life cycle approach.

HLTH489 Field Laboratory Projects and Workshop (1-6 Credits)
A course designed to meet the needs of persons in the field with respect to workshop and research projects in special areas of knowledge not covered by regularly structured courses.

HLTH490 Professional Preparation in Community Health (3 Credits)
The development of skills necessary for joining the public health work force post-graduation, as well as assistance in obtaining an appropriate internship that will serve as a final semester, capstone experience. Students will be exposed to various relevant professional experiences, and will be afforded the opportunity to strengthen their own individual skills by selecting from a menu of skills-based learning modules that best suit their perceived needs.
Prerequisite: Minimum grade of C- in EPIB301, EPIB315, SPHL100, HLTH124, HLTH140, HLTH200, HLTH230, HLTH302, BSCI170, BSCI171, and BSCI201. Students must have successfully completed or concurrently complete HLTH364.
Corequisite: Students must also enroll in HLTH420 and HLTH391.
Restriction: Must be in a major within the SPHL-Behavioral and Community Health department.

HLTH491 Community Health Internship (12 Credits)
Integrating theory with practice in a community health setting.
Prerequisite: Minimum grade of C- in HLTH420 and HLTH490.
Restriction: Must have completed all program requirements and be in the last semester of the Community Health degree program.

HLTH492 BS/MPH Community Health Internship (9 Credits)
Integrating theory with practice in a community health setting.
Prerequisite: Minimum grade of C- in HLTH490.
Restriction: Must be a Community Health major who has been admitted to the combined BS/MPH degree program.

HLTH498 Special Topics in Health (3 Credits)
Topics of special interest in areas not covered by regularly scheduled courses.
Repeatable to: 6 credits if content differs.

HLTH602 Global Health and Social Justice (3 Credits)
Evaluates the relationship between social justice and population health through critical discourse analysis of social determinants of health and applications of community-based methods for reducing population health inequities within and across national borders. The class aims to stimulate students' critical analysis to identify, describe, measure and apply consequences of injustices in population ill-health exposures and practices (policies, interventions and services). Students will apply critical thinking about how social injustices create preventable health disparities, unequal social determinants, poor environmental exposures and diseases among vulnerable populations in much of low income countries.

HLTH606 Foundations of Public Health Education and Policy (3 Credits)
Examines foundations and content of two professions, health education and public health, including history, mission, terminology, philosophy, ethical principles and scientific foundations. Emerging and reemerging threats to the public's health will be discussed, as well as societal influences on health and health policy. Also addresses professional competencies and preparation, and the role of professional organizations.
Restriction: Must be in MPH: Community Health Education (Master's) program; or must be in Ph.D.: Public and Community Health (Doctoral) program.

HLTH609 Public Health Journal Club (1 Credit)
Includes discussion of recent literature from leading peer-reviewed journals on a specific psychosocial construct and health outcome, with students presenting two articles during the semester. The purpose of this course is to read and consider health constructs and outcomes from a multidisciplinary perspective.
Restriction: Limited to Behavioral & Community Health doctoral and advanced MPH students; or permission of instructor.
Repeatable to: 4 credits.

HLTH624 Advanced Lesbian, Gay, Bisexual & Transgender Health (3 Credits)
The preparation of students to be knowledgeable advocates for the health of lesbian, gay, bisexual, and transgender (LGBT) populations. Course focus is defined by the Healthy People 2020 federal health objectives for LGBT populations: data collection for research, culturally competent healthcare, bullying in schools, suicide, homelessness, and sexually transmitted diseases including HIV.
Recommended: Students should have some familiarity with basic psychology, sociology and/or epidemiology.
Credit Only Granted for: HLTH424 or HLTH624.

HLTH625 Community Assessment through Qualitative Methods (3 Credits)
A discussion of major paradigms in qualitative inquiry, an overview of the process of qualitative research, and an introduction to several qualitative research methods, including grounded theory, ethnography, phenomenology, and content analysis. Students will collect, transcribe, analyze, and present qualitative data using introductory interview and analytic techniques.
Restriction: Course will be restricted to Behavioral and Community Health graduate students.

HLTH635 Leadership in Crisis: Lessons from Select Public Health Issues (3 Credits)
Examine leadership successes and failures during the twin pandemics of COVID-19 and structural racism in the United States in 2020. Define a public health crisis and explore characteristics of highly functioning leaders during crises. Critically analyze current literature on leadership during these twin pandemics. Explore ways in which leaders adapt their own behavior and mobilize their workforce to respond to their constituencies to address crises. Students will critically analyze the performance of a current public health leader in a case study.

HLTH652 Quantitative Research Methods I in Public health (3 Credits)
Intermediate statistics and procedures in public health-related research for doctoral students. Focuses on applied statistics rather than theoretical, with emphasis on 1) how to apply statistical models, 2) how to perform the analysis with avialable software, and 3) how to interpret findings.
Restriction: Must be in MPH: Community Health Education (Master's) program; or must be in Ph.D.: Public and Community Health (Doctoral) program.
Credit Only Granted for: HLTH652 or HLTH688R.
Formerly: HLTH688R.

HLTH653 Quantitative Research Methods II in Public Health (3 Credits)
Intermediate and advanced statistics and procedures in health-related research for doctoral students with the focus on applications of these statistical methodological methods to public health research.
Prerequisite: HLTH652.
Restriction: Must be in a major within SPHL-Behavioral & Community Health department.
Credit Only Granted for: HLTH653 or HLTH688T.
Formerly: HLTH688T.

HLTH665 Health Behavior I (3 Credits)
The psychological, social psychological, and sociological theories of health behavior. The relation of health knowledge, beliefs, attitudes, intentions, and behavior to preventive, illness, sick-role, and health utilization behaviors.

HLTH666 Health Behavior II (3 Credits)
An advanced course with intensive training in health behavior research and the opportunity to carry out original research in health behavior. Patient-provider interaction, patient cooperation with medical treatment and other social and psychological influences on health care.
Prerequisite: HLTH665.

HLTH671 Public Health Communication (3 Credits)
An exploration of the the broad and diverse field of health communication including medical encounters, everyday communication about health, advertising, news, public health campaigns, community outreach, public policy, and international programs. Theories and applied efforts that have been studied and documented will be examined.
Restriction: Non-SPH students must obtain permission from the instructor prior to registering.
Credit Only Granted for: HLTH670 or HLTH671 and HLTH672.
Formerly: HLTH670.

HLTH672 Public Health Informatics (3 Credits)
A basic overview of Informatics and its application in a public health setting. The major goal is for students to understand the basic tools and building blocks needed to utilize this technology in order to improve their professional productivity
Restriction: Instructor permission is required for students not enrolled in a degree seeking program in the School of Public Health. Cross-listed with EPIB672.
Credit Only Granted for: HLTH670 or HLTH671, HLTH672, EPIB 672.
Formerly: HLTH670.
Additional Information: Course hashtag - #umdphi12.

HLTH674 Health Literacy (3 Credits)
Introduction to health literacy research, practice, and skills. The course will develop students' understanding of how health literacy is both a barrier and an asset for health. We will also examine how health literacy affects a wide range of outcomes. Students will learn the basics of health literacy concepts, models, and research methods, and discuss health literacy research and evaluation in clinical, public health, and community settings. Students will study key health topics, populations, and contexts for health literacy research and practice. The course will describe professional skills necessary for effective public health communication practice and provide opportunities to practice the skills. The implications of research for public health practice, policy, and consumer/patient interventions and behavior will be integrated so that public health practitioners and researchers are prepared to address health literacy in their future work.
Recommended: Health communication, communication, journalism, literacy, or cognitive or information sciences classes.
Credit Only Granted for: HLTH688L or HLTH674.
Formerly: HLTH688L.

HLTH688 Special Problems in Health Education (1-6 Credits)

HLTH709 Public Health Research Journal Club (1 Credit)
Discussion of recent research literature from top peer-reviewed journals focusing on cutting edge research issues related to public health. Examines public health research issues and their relationship to the conduct and application of public health practice.
Restriction: Must be in Ph.D.: Public and Community Health (Doctoral) program; or must be an advanced MPH Behavioral and Community Health student; or permission of instructor.
Repeatable to: 4 credits.

HLTH710 Methods and Techniques of Research (3 Credits)

HLTH711 Advanced Research Methods in Health (3 Credits)
Quantitative techniques, advanced research methods and design issues.
Prerequisite: HLTH710.
Restriction: Must be in MPH: Community Health Education (Master's) program; or must be in Ph.D.: Public and Community Health (Doctoral) program.

HLTH712 Applied Research Methods in Behavioral and Community Health (3 Credits)
Designed to build on the research skills obtained in HLTH710 and other fundamental research methods and statistics courses. Methods and problems that are commonly encountered in health education research will be discussed including examination of actual research studies. Complex behavioral research issues will be addressed with existing research data sets. With these data sets, students will develop an analytic plan and conduct data analysis.
Prerequisite: HLTH710.

HLTH742 Professional Writing and Presentations (3 Credits)
Acquaints students with various types of professional writing required of public health professionals, including: grant proposals; journal articles; textbooks; presentation proposals and papers; and theses and dissertations. Includes both the form and content of technical documents as well as the processes of writing, peer review, and critique.
Restriction: Must be in MPH: Community Health Education (Master's) program; or must be in Ph.D.: Public and Community Health (Doctoral) program.
Credit Only Granted for: HLTH742 or HLTH688W.
Formerly: HLTH688W.

HLTH774 Community Health Program Planning (3 Credits)
An introduction to the development, planning, and administration of community health programs. The overall goal of this course is to develop a program and conceptualize the implementation of the intervention.
Restriction: Must be in a major within SPHL-Behavioral & Community Health department; or permission of instructor.
Credit Only Granted for: HLTH775 or HLTH774 and HLTH776.
Formerly: HLTH775.

HLTH775 Health Education Program Planning and Evaluation (3 Credits)
A systematic approach to the planning and evaluation of Health Education programs. Diagnosis of the social, psychological, educational and administrative aspects of the health education program. Program monitoring, rigorous methods of impact assessment, and the measurement of efficiency.
Prerequisite: HLTH710; and permission of SPHL-Behavioral & Community Health department.

HLTH776 Community Health Program Evaluation (3 Credits)
An application of basic research methods, and the evaluation of community health programs. Students will evaluate the effectiveness of a community health intervention.
Prerequisite: HLTH710 and HLTH774.
Restriction: Must be in a major within SPHL-Behavioral & Community Health department; or permission of instructor.
Credit Only Granted for: HLTH775 or HLTH774 and HLTH776.
Formerly: HLTH775.

HLTH778 Internship in Public Health (1-4 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Prerequisite: SPHL601, SPHL602, SPHL603, SPHL610, SPHL611, HLTH665, HLTH672, and HLTH710.
Repeatable to: 4 credits.
Credit Only Granted for: HLTH785 or HLTH778.

HLTH780 Community Health (3 Credits)
Overview of public health organizations, programs, and policies, including their structure and function, and their ability to change with changing community health needs.
Credit Only Granted for: HLTH740 or HLTH780.

HLTH785 Internship in Public Health (3 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Prerequisite: HLTH665, HLTH775, and HLTH780; or permission of SPHL-Behavioral & Community Health department.
Credit Only Granted for: HLTH785 or HLTH778.

HLTH786 Capstone Project in Public Health (3 Credits)
Capstone experience providing opportunity to apply knowledge and skills to a specific public health problem or issue. Completion of project relevant to public health under the direction of an advisor.
Prerequisite: Must have completed all required coursework; and permission of SPHL-Behavioral & Community Health department.
Restriction: Must be in a major within SPHL-Behavioral & Community Health department.

HLTH799 Master's Thesis Research (1-6 Credits)

HLTH898 Pre-Candidacy Research (1-8 Credits)

HLTH899 Doctoral Dissertation Research (1-8 Credits)

IMMR - Immigration Studies

IMMR400 Vital Voices: Oral Histories of the Immigrant Experience (3 Credits)
An exploration of the dynamic subject of U.S. immigrant experience through the scope of individual immigrant life stories in a global context. Course will include an overview of U.S. and global immigration patterns and an introduction to the practice of oral history.
Recommended: HIST222; or IMMR200.
Credit Only Granted for: HIST428N, IMMR400, THET428I, or THET498V..
Formerly: HIST428N.

IMMR419 Special Topics in Immigration and Migration Studies (3 Credits)
Thematic exploration of a topic in immigration or migration studies history with emphasis on understanding how the movement of people is relevant in the contemporary world.
Repeatable to: 6 credits if content differs.

INFM - Information Management

INFM600 Information Environments (3 Credits)
An exploration of various models and methodologies used to capture and deploy internal and external information and knowledge in a number of settings; organizational analysis in terms of information creation, flow, sharing, conservation, and application to problem solving; internal and external influences on the management of information and knowledge; various information flows; information management in a variety of settings.
Restriction: Permission of INFO-College of Information Studies.

INFM603 Information Technology and Organizational Context (3 Credits)
Application of communication and information technologies to support work processes, including technology-enhanced communication networks, computer-supported collaborative work, decision-support systems, interactive systems, and systems analysis. Acquisition of information systems and their integration into the organization.
Restriction: Must not have completed LBSC671 or LBSC690; and permission of INFO-College of Information Studies.

INFM605 Users and Use Context (3 Credits)
Use of information by individuals. Nature of information. Information behavior and mental models. Characteristics of problems, task analysis, problem solving, and decision making. Methods for determining information behavior and user needs. Information access. Information technology as a tool in information use.
Restriction: Permission of INFO-College of Information Studies.

INFM612 Management Concepts and Principles for Information Professionals (3 Credits)
Key aspects of management - focusing on planning, organizing, leading and controlling. The evolution of management, innovative management for the changing world, management styles and leadership, managerial planning, goal setting and decision making. Ethical issues, designing adaptive organizations responding to change, global environment, diversity, and utilizing the appropriate technology to provide effective management of information programs and services.
Restriction: Permission of INFO-College of Information Studies.

INFM620 Introduction to Strategic Information Management (3 Credits)
Strategic management is the comprehensive collection of tasks, activities, and processes organizations use to coordinate and align resources and actions with its mission, vision, and strategy. Due to changes occurring in our global landscape, the integration of business and technology is compelling organizations to move beyond traditional, reactive, and silo-based data management approaches to a managed, predictive approach that treats information as a strategic asset and uses it to create business value. To meet challenges of this hyper-competitive environment, this course will provide you with an introduction to the strategic management of information assets for competitive differentiation and sustained business success.
Prerequisite: INFM612; or LBSC631; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INFM700 Information Architecture (3 Credits)
Principles and techniques of information organization and architecture for the Web environment. Structured description of digital resources, including data modeling techniques, metadata schemes, and user-oriented navigation systems.
Prerequisite: INFM603; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INFM711 Financial Management of Information Projects (3 Credits)
Techniques and strategies of planning and executing successful projects. Project budgets, work breakdown structures and scheduling techniques, earned value, tracking and reporting project costs, risk management, best practices, and cost/benefit analysis.
Prerequisite: INFM600; and must have completed or be concurrently enrolled in INFM612. Or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INFM714 Principles of Competitive Intelligence (3 Credits)
Intelligence process and how to build business advantage by the collection and analysis of the capabilities, vulnerabilities, market positioning and strategic planning of competitors using open source information.
Prerequisite: INFM600; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM714 or INFM718W.
Formerly: INFM718W.

INFM718 Selected Topics in Information Management (1-3 Credits)
Selected topics in information management.
Repeatable to: 9 credits if content differs.

INFM719 Independent Study (1-3 Credits)
Intensive individual study under faculty supervision.
Restriction: Permission of instructor; and must be in Information Management (Master's) program; and permission of INFO-College of Information Studies.
Repeatable to: 6 credits if content differs.
Additional Information: Faculty permission and Independent Study Contract required.

INFM732 Information Audits and Environmental Scans (3 Credits)
Methods and techniques to monitor organizational environment to identify opportunities and threats and relate them to the strengths and weaknesses of the organization to fulfill organization information needs and their sustainability. Information audit to determine the existing information environment by assessing the information needs of the organization, determining the information currently available. Application of information audits and environmental scans in strategic information management.
Prerequisite: INFM600; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM730, INFM731, or INFM732.

INFM735 Internship in Information Management (3 Credits)
Introduction to information management issues in the workplace, including the knowledge, skills, and experience necessary for success in high-impact information management positions. Securing and facilitating mentor relationships, and the development of actionable professional development plans.
Prerequisite: INFM600, INFM603, INFM605, and INFM612; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INFM736 Information Management Experience (3 Credits)
The Information Management Capstone Experience I and II are the culminating experience of the Master of Information Management program, taken in the students final two semesters. The capstone experience provide students with the opportunity to integrate and synthesize the knowledge and skills acquired throughout their MIM course work while working in a real world Information Management project. These courses must be taken in succession.
Prerequisite: INFM600; and INFM612; and INFM605; and INFM603. Or permission of instructor.
Restriction: Must be in Information Management (Master's) program; and permission of INFO-College of Information Studies.

INFM737 Information Management Capstone Experience (3 Credits)
The Information Management Capstone Experience I and II are the culminating experience of the Master of Information Management program, taken in the students final two semesters. The capstone experience provide students with the opportunity to integrate and synthesize the knowledge and skills acquired throughout their MIM course work while working in a real world Information Management project. These courses must be taken in succession.
Prerequisite: INFM736; and must have earned a minimum of 27 credits in the MIM Program. Or permission of instructor.
Restriction: Must be in Information Management (Master's) program; and permission of INFO-College of Information Studies.

INFM747 Web-Enabled Databases (3 Credits)
Basic methods and tools for developing dynamic, database-driven web sites. Acquiring, installing, and running web servers, database servers, and connectability applications. Developing web interfaces and application-layer components.
Prerequisite: INFM603, LBSC690, or LBSC671; and INST733. Or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM747 or INFM718N.
Formerly: INFM718N.

INFM757 Organizational and Business Process Modeling (3 Credits)
General principles of modeling, including methods for modeling organizational and business process for information applications and strategy development. Approaches to evaluating models based on their accuracy and usefulness.
Prerequisite: Must have completed at least 9 credits in the College of Information Studies; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM718V OR INFM757.
Formerly: INFM718V.

INFM799 Master's Thesis Research (1-6 Credits)
Intensive individual research course under the supervision of a faculty member.
Prerequisite: INST701; or permission of instructor.
Restriction: Must be in Information Management (Master's) program; and permission of instructor; and permission of INFO-College of Information Studies.
Repeatable to: 9 credits.

INST - Information Studies

INST401 Design and Human Disability and Aging (3 Credits)
Focuses on the design of consumer products and information systems to enable their use by persons with a wider range of physical, sensory, and cognitive abilities. Overviews aging and major types of impairment as they relate to resulting problems using consumer products and information systems. Focuses on principles of design of mass market products.
Restriction: Permission of instructor.
Credit Only Granted for: INST408B or INST401.
Formerly: INST408B.

INST402 Designing Patient-Centered Technologies (3 Credits)
Companies have created a vast array of apps and other technologies for understanding managing personal health and wellness, but many of them have been created with little understanding of audience needs or potential ethical issues. Course introduces students to the unique challenges of studying people's health and wellness needs as well as designing and evaluating technologies to meet those needs.
Prerequisite: A minimum of a C- in INST201, MATH115, PSYC100, INST126, and STAT100.
Restriction: Must be in the Information Science program.

INST403 Computational Journalism (3 Credits)
Designed to teach the application of computational methods in journalism and reporting. The methods include natural language processing, visualization, and web data mining. The course will also cover the necessity and impact of journalistic ethics in designing computation solutions.
Prerequisite: Permission of the Philip Merrill College of Journalism.
Cross-listed with: JOUR473. Jointly offered with: JOUR773.
Credit Only Granted for: JOUR479V, JOUR473, INST408I or INST403.
Formerly: JOUR479V and INST408I.

INST408 Special Topics in Information Science (1-6 Credits)
Selected topics in information science.
Prerequisite: 1 course with a minimum grade of C- from (INST201, INST301); and minimum grade of C- in INST126, STAT100, PSYC100, and MATH115.
Restriction: Must be in Information Science program.
Repeatable to: 9 credits if content differs.

INST414 Data Science Techniques (3 Credits)
An exploration of how to extract insights from large-scale datasets. The course will cover the complete analytical funnel from data extraction and cleaning to data analysis and insights interpretation and visualization. The data analysis component will focus on techniques in both supervised and unsupervised learning to extract information from datasets. Topics will include clustering, classification, and regression techniques. Through homework assignments, a project, exams and in-class activities, students will practice working with these techniques and tools to extract relevant information from structured and unstructured data.
Prerequisite: 1 course with a minimum grade of C- from (INST201, INST301); and minimum grade of C- in INST126, INST314, STAT100, MATH115, and PSYC100.
Restriction: Must be in Information Science program.

INST441 Information Ethics and Policy (3 Credits)
Explores via case studies the legal, ethical, and technological challenges in developing and implementing policies for managing digital assets and information. Emphasizes access questions pertinent to managing sensitive information and the roles and responsibilities of information professionals.
Prerequisite: Minimum grade of C- in MATH115, PSYC100, INST201, INST126, and STAT100.
Restriction: Must be in the Information Sciences program.

INST442 Digital Curation Across Disciplines (3 Credits)
Examines how to apply digital curation principles, tools, and strategies in managing diverse data collections and digital information in different disciplinary settings. Explores differences among data curation principles and practices across diverse settings, ranging from scientific organizations (such as business and academic research laboratories and computational science settings), to humanities-based institutions (such as cultural heritage organizations) to social science-based institutions (such as data-intensive professional environments).

INST443 Tools and Methods for Digital Curation (3 Credits)
Introduces students to the application of digital tools and methods in a variety of organizational settings, academic disciplines, and economic sectors.
Prerequisite: Must have completed or be concurrently enrolled in INST341.

INST447 Data Sources and Manipulation (3 Credits)
Examines approaches to locating, acquiring, manipulating, and disseminating data. Imperfection, biases, and other problems in data are examined, and methods for identifying and correcting such problems are introduced. The course covers other topics such as automated collection of large data sets, and extracting, transforming, and reformatting a variety of data and file types.
Prerequisite: 1 course with a minimum grade of C- from (INST201, INST301); and minimum grade of C- in INST126, INST327, STAT100, MATH115, and PSYC100; and 1 course with a minimum grade of C- from (INST326, CMSC131).
Restriction: Must be in Information Science program.

INST448 Digital Curation Research in Cultural Big Data Collections (3 Credits)
Students will learn the principles, methods, and technologies involved in the digital curation of large cultural data collections. Students will learn these concepts in class lectures, discussions, and participating on project teams in the Digital Curation Innovation Center (DCIC).
Prerequisite: INST311.
Restriction: Must be in Information Science program.
Repeatable to: 6 credits if content differs.

INST452 Health Data Analytics (3 Credits)
Health data analytics involves the extrapolation of actionable insights from patient data, using data sources such as electronic health records (EHRs), claims data, surveillance data, and surveys. Health data is complex, often unstructured and incomplete, and is organized for clinical care rather than to meet analytic needs. This course will involve the use of various analytical methods in order to translate large and complex data, whether structured or unstructured, into insights that improve decision-making from both the patient and provider perspectives. Healthcare data are rich and hold so much potential, but a challenge is presented to patients, providers, and even government agencies when it comes to figuring out how to leverage these data. Students in this course will learn foundational topics in data analytics focused on health data and will apply this knowledge to real health datasets through hands-on labs integrated into the lectures.
Prerequisite: Minimum of a C- in INST201, MATH115, PSYC100, INST126, and STAT100.
Restriction: Must be in the Information Science program.

INST462 Introduction to Data Visualization (3 Credits)
Exploration of the theories, methods, and techniques of visualization of information, including the effects of human perception, the aesthetics of information design, the mechanics of visual display, and the semiotics of iconography.
Prerequisite: 1 course with a minimum grade of C- from (INST201, INST301); and minimum grade of C- in INST126, INST314, MATH115, PSYC100, and STAT100.
Restriction: Must be in Information Science program.

INST464 Decision Making for Cybersecurity (3 Credits)
Discusses human and organizational decision making from a variety of perspectives. Applies different risk assessment and decision making frameworks that are relevant to personal and organization cybersecurity, with a focus on the quantitative Factor Analysis of Information Risk (FAIR) model. Considers monetary, social and societal costs of cybersecurity decisions. Considers a range of questions relating to cybersecurity, from whether to install a game on a smartphone to how to allocate scarce information security resources in an organization.
Prerequisite: Must have earned a minimum grade of C- in INST201, INST126, MATH115, PSYC100, and INST364.
Restriction: Must be in Information Science program.
Credit Only Granted for: INST408W or INST464.
Formerly: INST408W.

INST465 Design and Human Disability and Aging (3 Credits)
Design of special and mainstream products and systems to include use by people facing barriers to use due to disability and aging. Includes introduction to people with disabilities and the tools they use and strategies for cross-disability inclusive design of special and mainstream technology.The class will then be divided into interdisciplinary design teams. These teams will be given a special or mass market product for which they are to develop a design which is more accessible, yet remains mass producible and marketable. Emphasis will be on practical mass-market design and the realities and constraints of design for commercial production and/or public systems.
Credit Only Granted for: INST408B or INST465.
Formerly: INST408B.

INST466 Technology, Culture, and Society (3 Credits)
Individual, cultural, and societal outcomes associated with development of information & communication technologies (ICTs), including pro- and anti-social factors. Unpacking how gender, race, ethnicity, sexual orientation, disabilities, and political affiliations affect consumption and production of online experiences. Unpacking how structures of dominance, power and privilege manifest at individual, institutional and cultural levels.
Prerequisite: 1 course with a minimum grade of C- from (INST201, INST301).
Restriction: Must be in the Information Science program.

INST467 Fundamentals of Cybersecurity for Policy Makers (3 Credits)
Explores the key issues facing policy makers attempting to manage the problem of cybersecurity from its technical foundations to the domestic and international policy considerations surrounding governance, response, critical infrastructure risk management, and privacy. Designed for students with little to no background in information technology, and will provide the principles to understand the current debates shaping a rapidly evolving security landscape.
Prerequisite: Minimum grade of C- in INST126, INST201, INST364, MATH115, STAT100, and PSYC100.
Restriction: Must be in Information Science program.
Credit Only Granted for: INST408V, PLCY388C, or INST467.
Formerly: INST408V.

INST490 Integrated Capstone for Information Science (3 Credits)
The capstone provides a platform for Information Science students where they can apply a subset of the concepts, methods, and tools they learn as part of the Information Science program to addressing an information problem or fulfilling an information need.
Prerequisite: 1 course with a minimum grade of C- from (INST201, INST301); and minimum grade of C- in INST126, INST311, INST314, INST326, INST327, INST335, INST346, INST352, INST362, PSYC100, STAT100, and MATH115.
Restriction: Must be in Information Science program; and permission of INFO-College of Information Studies.

INST603 Systems Analysis and Design (3 Credits)
Formal process for planning and designing an information technology system, including identifying users and other stakeholders, analyzing work processes, preparing system specifications, conducting feasibility and usability studies, and preparing for implementation. Approaches to analyzing system components and functions. Measurement and evaluation of system performance.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST603, LBSC603, or INFM613.
Formerly: INFM613

INST604 Introduction to Archives and Digital Curation (3 Credits)
Overview of the principles, practices, and applications in the archival and digital curation fields.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC604 or LBSC605.

INST607 Government Information (3 Credits)
An introduction to the nature and scope of government information (federal, state, and local). Tracing the ongoing efforts of government agencies to offer information, services, and resources online, this course also examines the nature and current impact of new technologies on participatory democracy. More specifically, the course explores information and communication technologies designed to make government more open and transparent; the design, implementation, and evaluation of new government and governance mechanisms, including through the use of social media and AI; the role of legal authorities and information institutions such as libraries in supporting access to government information; and the development and implementation of selected public facing online tools (e.g., data visualization, crowd-sourcing, etc.).
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM718E, INST607, or LBSC708E.
Formerly: INFM718E and LBSC708E.

INST608 Special Topics in Information Studies (1-3 Credits)
Covers special topics in information studies.
Repeatable to: 6 credits if content differs.

INST610 Information Ethics (3 Credits)
Investigation of the diverse range of ethical challenges facing society in the information age. Ethical theories, including non-Western and feminist theories. Application of theories to information ethics issues.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM718Q, INST610, or LBSC708I.
Formerly: INFM718Q and LBSC708I.

INST611 Privacy and Security in a Networked World (3 Credits)
Evolving conceptualization of privacy and security issues in light of technological developments in the 21st century. Analysis of legal, ethical, design, and socially constructed challenges that organizations and individuals face when developing privacy and security solutions.
Restriction: Permission of INFO-College of Information Studies.

INST612 Information Policy (3 Credits)
Nature, structure, development and application of information policy. Interactions of social objectives, stakeholders, technology and other forces that shape policy decisions.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST612 or LBSC625.
Formerly: LBSC625.

INST613 Information and Human Rights (3 Credits)
An examination of information as a human right, including topics: social, cultural, economic, legal, and political forces shaping information rights; the impact of information rights on information professions, standards, and cultural institutions; and information rights and disadvantaged populations.
Restriction: Permission of INFO-College of Information Studies.

INST614 Literacy and Inclusion (3 Credits)
The educational and psychological dimensions of helping and supporting new users to become information literate and experienced users to remain engaged.
Restriction: Permission of INFO-College of Information Studies.

INST615 Information Professionals and the Law (3 Credits)
An exploration of the interrelated issues of the provision of and information literacy about legal information by information organizations and the impacts of legal issues, such as privacy and filtering, on the practice of information organizations that serve the public.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC735 OR INST615.
Formerly: LBSC735.

INST616 Open Source Intelligence (3 Credits)
An introduction to Open Source Intelligence (OSINT) for Information Professionals. For the purposes of this course, OSINT is defined as the use of free, publicly available online sources to gather information about people, organizations/groups, places, businesses, activities/events, and capabilities. Collected information is used to conduct analysis or reach conclusions with estimated level of certainty. Students will learn basic and advanced techniques for using search engines, people directories, social networks, location-based services, images and videos, public records, domain analytics, documents, archives, and other sources. Throughout the modules, data quality and validation procedures will be key topics. Professional applications of the skills taught are extensive and include libraries, law offices, journalism, human resources, competitive intelligence, law enforcement, opposition research, government agencies, ethical hacking, and many more.
Restriction: Permission of INFO-College of Information Studies.

INST617 Computational Journalism (3 Credits)
Designed to teach the application of computational methods in journalism and reporting. The methods include natural language processing, visualization, and web data mining. The course will also cover the necessity and impact of journalistic ethics in designing computation solutions.
Prerequisite: Permission of the Philip Merrill College of Journalism.
Cross-listed with: JOUR773. Jointly offered with: JOUR473.
Credit Only Granted for: JOUR779V, JOUR773, JOUR473, JOUR479V, INST617, INST408I, or INST403.
Formerly: JOUR779V.

INST620 Diverse Populations, Inclusion, and Information (3 Credits)
Importance of equality of information access. Social, political, and technological barriers to information. Information needs of diverse and underrepresented populations. Principles of inclusive information services.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC620 OR INST620.
Formerly: LBSC620.

INST621 Managing Digital Innovations in Organizations (3 Credits)
Students will learn the main theoretical perspectives on managing digital innovations, become familiar with current best practices of innovating with IT, and develop innovation skills in various organizational settings such as project teams, functional departments, organizations, communities, and society at large.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM718Z or INST621.
Formerly: INFM 718Z.

INST622 Information and Universal Usability (3 Credits)
Information services and technologies to provide equal experiences and outcomes to all users. Laws, standards, approaches, component concepts, access needs, and technologies in relation to physical and online information environments.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC622 OR INST622.
Formerly: LBSC622.

INST627 Data Analytics for Information Professionals (3 Credits)
Skills and knowledge needed to craft datasets, perform quantitative and qualitative analyses, and develop information resources that bridge the gap between raw data and decision makers' needs.
Restriction: Permission of INFO-College of Information Studies.

INST630 Introduction to Programming for the Information Professional (3 Credits)
An introduction to computer programming intended for students with no previous programming experience. Topics include fundamentals of programming and current trends in user interface implementation that are relevant to information professionals.
Restriction: Permission of INFO-College of Information Studies.

INST632 Human-Computer Interaction Design Methods (3 Credits)
Methods of user-centered design, including task analysis, low-tech prototyping, user interviews, usability testing, participatory design, and focus groups.
Prerequisite: LBSC671, INFM603, or INST631; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST633 Analyzing Social Networks and Social Media (3 Credits)
Introduces students to the science and social science of network analysis. Through real world examples, including analysis of their own social networks, students will develop skills for describing and understanding the patterns and usage of services like Facebook, Twitter, YouTube, and others. Students will read classic and cutting edge articles and books about these topics and discuss their applicability to this new social media. The class will culminate with a capstone project in which students will apply the analysis methods they have learned to understanding a particular question about social networks and social media.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC708L or INST633.
Formerly: LBSC708L.

INST638 HCI Professional Preparation Seminar (1 Credit)
The human-computer interaction area is huge and diverse, yet all HCI professionals will face a common set of challenges upon embarking into their future careers, including job hunting, interviewing, joining a team, managing group dynamics, and staying abreast of current technology. Students will learn how to tackle these challenges from a series of speakers familiar with current industry practice.
Repeatable to: 3 credits if content differs.

INST639 Practical Skills in HCI (1-3 Credits)
Current industry practice in the HCI and UX field involves being familiar with many practical skills and specialized software. In this repeatable course, HCIM students will be able to acquire some of these vital practical skills in order to be better prepared for joining industry upon graduation. Furthermore, this will also be an opportunity for students to develop their portfolio for future job hunts. Offered in both Fall and Spring semesters, the intention is for these "practical skills" to be taught by professional instructors with expert knowledge. The content of the course will vary from semester to semester, but here is a sample of topics: Graphic and visual design and communication; UX design and research in games; Voice and gestures; UX mockups and wireframing tools; Practical web design and technologies; UX project management software.
Repeatable to: 9 credits if content differs.

INST640 Principles of Digital Curation (3 Credits)
Principles for the design and implementation of long-term curation of digital data and information assets, including born-digital and digitized assets. Frameworks for analysis of technical, practical, economic, legal, social and political factors affecting digital curation decisions. Case studies of specific digital curation scenarios.
Restriction: Permission of INFO-College of Information Studies.

INST641 Policy and Ethics in Digital Curation (3 Credits)
Discussion of strategies to address intellectual property, privacy, security and other policy and ethics concerns raised by the curation of digital records and data.
Prerequisite: INST604; or INST640; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST643 Curation in Cultural Institutions (3 Credits)
An overview of the principles, practices, and current debates in the management, care and representation of digital artifacts in libraries, archives, and museums.
Restriction: Permission of INFO-College of Information Studies.

INST644 Introduction to Digital Humanities (3 Credits)
A survey of the history, methods, and principal topics of the Digital Humanities, examined from theoretical and applied perspectives.
Restriction: Permission of INFO-College of Information Studies.

INST645 Personal Digital Curation (3 Credits)
Discussion and workshop in selecting and preserving digital personal data and records.
Restriction: Permission of INFO-College of Information Studies.

INST646 Principles of Records and Information Management (3 Credits)
Principles and practices of managing records in the context of information management programs in government, corporate and other institutional settings. Includes access; legal requirements; digital technologies; and creation, administration, appraisal, and retention and disposition of records.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC680 OR INST646.
Formerly: LBSC680.

INST647 Management of Electronic Records & Information (3 Credits)
Focuses on the life cycle of records and the impact of technology programs for managing electronic records. Explores the roles of records managers in the management of electronic records.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC682 OR INST647.
Formerly: LBSC682.

INST650 Facilitating Youth Learning in Formal and Informal Environments (3 Credits)
The historical, organizational, and contemporary contexts of formal and informal learning spaces; the principles of teaching, learning, and information literacy that underlie the formal and informal learning spaces; and the leadership role that information professionals can play within their schools, libraries and communities.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST650 or LBSC640.
Formerly: LBSC640.

INST651 Promoting Rich Learning with Technology (3 Credits)
Exploration of how technology can be used to promote rich learning experiences, with a particular focus on youth populations. Assessment of the how, when, and why of infusing technology into the teaching and learning process.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST651 or LBSC642.
Formerly: LBSC642.

INST652 Design Thinking and Youth (3 Credits)
Methods of design thinking specifically within and for youth contexts, including user-centered design, understanding user needs, ideation, contextual design, participatory design, iterative prototyping, and visual design. These topics will specifically be studied in the context of designing with and for youth.
Restriction: Permission of INFO-College of Information Studies.

INST660 Strategic Leadership (3 Credits)
Students will use research and best practices to act and think like a leader, increase your self-awareness, and learn how to unlock potential in others. From the stories of great leaders and everyday people, you will learn and practice empowerment, accountability, courage, creativity, and humility, which are the key leadership skills. In addition, this course will teach you how to create new opportunities and lasting impact to drive growth and value creation in your organization.
Prerequisite: INFM612; or LBSC631; or LBSC635; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST660, LBSC708F or INFM718F.
Formerly: LBSC708F, INFM718F.

INST661 Introduction to Game, Entertainment, and Media Analytics (3 Credits)
With the continuing global growth in the Game, Entertainment, and virtual/augmented reality and immersive experiences industries, entertainment providers increasingly depend on data analytics to maintain a competitive edge while continuing to improve the customer experience. This course provides an overview of the Game, Entertainment, and Media (GEM) industries, discuss the relationships between the entertainment providers and the entertainment consumers, and explore the analytical techniques used to maximize the overall value to both the providers and consumers. The course will focus on the uses of analytics methods such as personalization, recommendation, clustering and segmentation, behavioral analytics, etc., will discuss core data management and data architecture concerns, and examine how big data infrastructure can support scalability as data volumes grow and as streaming speeds accelerate. In addition we review socio-technical aspects of entertainment, especially in the areas of cyberpsychology, social networks, and information policy concerns such as privacy protection, fraud, equity, and national security concerns.
Prerequisite: Permission of the instructor.

INST670 Introduction to Javascript Programming (1 Credit)
Introduction to the fundamentals of Javascript programming. Basic components of all programming languages, including variables, types, data structures, and control flow, with a focus on leveraging Javascript libraries for more advanced functionality. No prior experience needed.
Credit Only Granted for: INST728N and INST670.
Formerly: INST728N.

INST671 Introduction to Web Programming (1 Credit)
Introduction to the fundamentals of designing and programming web sites. HTML programming extended by work with Cascading Style Sheets. Programming skills are complemented with fundamentals of design and usability. No prior programming experience needed.
Credit Only Granted for: INST728W or INST671.
Formerly: INST728W.

INST673 Hands On Machine Learning with Weka (1 Credit)
Students will receive hands on experience with the open-source machine learning tool Weka. Topics covered will be classification, regression, basic algorithm types, how to get data into a format Weka can process, how to interpret results, and basic document classification. The class will meet online.
Recommended: It is recommended that students have some familiarity with programming prior to taking this course.
Restriction: Permission of INFO-College of Information Studies.

INST680 Health Informatics (3 Credits)
An introduction to the ways in which medical data, information, and knowledge are created, stored and used. Students will gain an understanding of the current trends in the delivery of medical care and the ways in which these trends influence health information resources and systems.
Prerequisite: Must have completed or be concurrently enrolled in INFM600 or LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST680 or INST728F.
Formerly: INST728F.

INST681 Health Information Behavior (3 Credits)
Exploration of information needs of healthcare professionals and the general public, as well as how they seek information to fulfill these information needs, impacts and outcomes of health-related information-seeking by multiple populations. Examination of models and theories and empirical studies of patient and healthcare professional information behavior.
Prerequisite: INFM600; or LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST682 Personal Health Informatics & Visualization (3 Credits)
Personal Health Informatics cover a broad concept that encompasses an array of approaches to collect, store, share, analyze, and reflect on personal health data. Not only health care providers are relying on Health Technologies to improve patient care, people are increasingly using health devices and apps in their everyday life. Individuals have started using new technologies to collect data, increase awareness, and reflect on and change their behaviors. They also use various tools for curiosity and fun. This course will provide an overview of this exciting field and examine how social and behavioral theories can be applied to create effective health applications.It is difficult to create health technologies that can successfully be integrated into people's daily life due to many obstacles in individuals' data collection, integration, self-reflection, and sharing practices. Understanding these challenges is an important part of designing Health Technologies. Therefore, this course will cover HCI and design thinking methods that you can leverage in understanding the adoption of Health Technologies. Moreover, visualizations facilitate people to gain insights from their data, so we will cover common visualization approaches used in the personal data contexts.

INST701 Introduction to Research Methods (3 Credits)
Techniques and strategies of research as applied to the definition, investigation, and evaluation of information problems. Qualitative, quantitative, and mixed methods of research design methods are considered from the aspects of implementation, analysis, and interpretation.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC701, INFM718M or INST701.
Formerly: LBSC701, INFM718M.

INST702 Advanced Usability Testing (3 Credits)
Usability test design, implementation and analysis for computer and mobile devices; special attention will be paid to remote testing. Students will learn the complex process of coordinating and facilitating a usability test and how to synthesize test data into reports appropriate for various audiences.
Prerequisite: Permission of instructor; or (INFM605 or INST631).
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM702 or INST702.
Formerly: INFM702.

INST703 Visual Design Studio (3 Credits)
This hands-on studio course will help students develop foundational visual skills related to user experience (UX) design. Students will explore methodologies and processes used in many of the industry's top creative environments and study the entire visual design skillset, including concept development, content creation, system design, and tools and process.
Restriction: Must be in the Human-Computer Interaction Master's program.
Credit Only Granted for: INST728T or INST703.
Formerly: INST728T.

INST704 Inclusive Design in HCI (3 Credits)
An introduction to inclusive technology design, that is, the design and evaluation of user interfaces for diverse users and use contexts. Building on basic concepts in human-computer interaction, students will learn about design exclusion and barriers to use, and methods by which these can be overcome. Assistive input and output technologies will also be covered. Populations include older adults, users with visual, cognitive or motor impairments, users who are deaf or hard of hearing, children, users in low resource contexts, and users in mobile contexts. Research trends and practical design considerations (e.g., web accessibility requirements) will be covered. Students will interact with the material through readings, discussion, and individual and group assignments.
Prerequisite: INST631; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST728Z OR INST704.
Formerly: INST728Z.

INST705 Game Design Studio (3 Credits)
Learn the fundamentals of game design by applying elements and principles of game design, such as goals, rules, and challenges, to create board games, card games, and digital games. Students will be introduced to the basic tools and methods of game design: paper and digital prototyping, design iteration, design critique, and user testing. Students will design several games of different types to add to a growing portfolio of game design concepts. Students will also learn how to use their skills to deconstruct and critique the components of existing games, as well as gain an understanding of the role of the game designer in real-world game development teams.
Recommended: Programming experience will be useful, but not strictly necessary.
Credit Only Granted for: INST408J, INST608J or INST705.
Formerly: INST608J.

INST706 Project Management (3 Credits)
Comprehensive overview of project management, focusing on the needs of information resource (IR) projects. Concepts and techniques for planning and execution of projects including developing work breakdown structure, estimating costs, managing risks, scheduling, staff and resource allocation, team building, communication, monitoring, control, and other aspects of successful project completion.
Prerequisite: INFM603 and INFM612; or (LBSC631 and LBSC671); or (LBSC635 and LBSC670); or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST706 or INFM706.
Formerly: INFM706.

INST709 Independent Study (1-3 Credits)
Intensive individual study, reading, or research in an area of specialized interest under faculty supervision. Registration limited to the advanced student with the approval of the advisor and of the faculty member involved.
Prerequisite: Completion of all core courses.
Restriction: Permission of INFO-College of Information Studies; and permission of instructor.
Repeatable to: 9 credits.
Additional Information: A student may complete no more than 9 credits registered under 709 or a total of 12 credits registered under 708 and 709.

INST710 User Experience Research Methods (3 Credits)
Students will learn to conduct user research in industry and to provide foundational knowledge needed for academic research. It examines the theoretical and epistemological differences between research paradigms and provides an overview of qualitative, quantitative and mixed-method approaches. It overviews user-centered design (UCD) methods, and uses Contextual Inquiry/Contextual Design as the backbone for a research project, incorporating related formative UCD methods and techniques. It is a project-based course, where students conduct a semester-long project to prepare them for the HCIM Capstone as well as other types of formative user research.

INST711 Interaction Design Studio (3 Credits)
Covers basic interaction design principles and design process from a studio-based design perspective. Focuses on how to design for interactions that will resonate with your audiences: how the features and functions of a project get translated into something people find usable, useful, and desirable. Explores the role of interaction designers. Students design and prototype interactive products, systems, and services.
Prerequisite: Must have completed or be concurrently enrolled in INST631 and INST710.

INST714 Information for Decision-Making (3 Credits)
The use of information in organizational and individual decision-making. An examination of managers' behavior in using information; differences between the private and public sectors; and the roles of information professionals and information systems in decision-making.
Prerequisite: LBSC631 or INFM612; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM718A, INST714 or LBSC705.
Formerly: INFM718A and LBSC705.

INST715 Knowledge Management (3 Credits)
Nature, creation, acquisition, and use of knowledge. Strategic role of knowledge in organizations and institutions. Information and knowledge ecology. Structure and functions of knowledge management systems and the role of the Internet and intranets. Knowledge as intellectual capital. Roles of librarians and information professionals in the knowledge economy. Strategic issues and future trends.
Prerequisite: INFM600 or LBSC671; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST715 or LBSC715.
Formerly: LBSC715.

INST716 Information, Technology, and Society (3 Credits)
An exploration of the mutually constitutive relationship between information technology (IT) and society, including how IT transforms society and how society transforms IT.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST716, LBSC708T, or INFM718T.
Formerly: LBSC708T and INFM718T.

INST717 Internship Practicum in Human-Computer Interactions (3 Credits)
Required, supervised experience working in an industry, government, non-profit organization or an educational institution to address a problem in Human-Computer Interaction. Students will spend a minimum of 120 hours working in the agency during the internship.
Prerequisite: INST631 and INST632.
Recommended: INST701.
Restriction: Permission of INFO-College of Information Studies; and must be in Human-Computer Interaction (Master's) program.

INST725 Legal Research for Information Professionals (3 Credits)
An in-depth exploration the methods, resources, and context of conducting advanced legal research. After offering an overview of various types of legal materials, the course will focus on finding and analyzing legal materials through various primary sources, databases, secondary sources, and public records for government and corporate settings. The course will also discuss practical issues of conducting legal research, such as data management and budgeting.
Prerequisite: INST615.
Restriction: Permission of INFO-College of Information Studies.

INST726 Information Governance (3 Credits)
Offers a comprehensive introduction to information governance, an emerging discipline concerned with how organizations minimize risk and maximize the value associated with their information assets. Drawing from real-life examples from the private and public sectors, the course will explore important facets of information governance, including how institutions incorporate best practices in records and information management, data storage and archiving, e-discovery, privacy, cybersecurity, analytics, risk management, and compliance. The course will also provide practical lessons in developing a state-of-the-art information governance program.

INST728 Special Topics in Information Studies (1-3 Credits)
Selected topics in information studies.
Restriction: Permission of INFO-College of Information Studies.
Repeatable to: 9 credits if content differs.

INST729 International Opportunities in Information Studies (3 Credits)
Short term, experiential course offered in conjuction with the University's Study Abroad Office, to volunteer, complete a project, or conduct research in a library or information organization outside the U.S. Focus and location varies.
Prerequisite: Permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Formerly: LBSC708S and LBSC729.

INST733 Database Design (3 Credits)
Principles of user-oriented database design. Requirements analysis. Data modelling. Data integrity and security and multi-user databases. Implementing an information system using a database management system (DBMS).
Prerequisite: LBSC690, LBSC671, or INFM603; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST733 or LBSC793.
Formerly: LBSC793.

INST734 Information Retrieval Systems (3 Credits)
Principles of organizing and providing access to information using automated information storage and retrieval systems. Retrieval systems models, index language selection, data structure, user interfaces, and evaluation for text and multimedia applications.
Prerequisite: LBSC671 or INFM603; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST734 or LBSC796.
Formerly: LBSC796.

INST735 Natural Language Processing (3 Credits)
Introduce fundamental concepts, techniques, and algorithms for the computational handling of natural language. Statistical and machine learning techniques, models, and algorithms that enable computers to deal with the ambiguity and implicit structure of human language. Approaches that focus on uncovering linguistic structure, such as syntactic or semantic parsing, as well as those that focus on manipulating text in useful ways, such as question answering or machine translation.
Prerequisite: Minimum grade of C- in CMSC422; and permission of CMNS-Computer Science department. Cross-listed with: CMSC723, LING723.
Credit Only Granted for: CMSC723, LING723, or INST735.
Additional Information: CMSC students may only receive PhD Comp. credit for CMSC723 or CMSC823, not both.

INST736 Computational Linguistics II (3 Credits)
Natural language processing with a focus on corpus-based statistical techniques. Topics include: stochastic language modeling, smoothing, noisy channel models, probabilistic grammars and parsing; lexical acquisition, similarity-based methods, word sense disambiguation, statistical methods in NLP applications; system evaluation.
Prerequisite: LING723, CMSC723, or INST735; or permission of instructor. Cross-listed with CMSC773, LING773.
Credit Only Granted for: CMSC773, LING773, or INST736.
Additional Information: CMSC students may only receive PhD Comp. credit for CMSC723 or CMSC823, not both.

INST737 Introduction to Data Science (3 Credits)
An exploration of some of the best and most general approaches to get the most information out of data through clustering, classification, and regression techniques.
Prerequisite: INST627 and (LBSC690, LBSC671, INFM603, or JOUR652).
Restriction: Permission of INFO-College of Information Studies.

INST741 Social Computing Technologies and Applications (3 Credits)
Tools and techniques for developing and configuring social computing applications. Theories and paradigms for social computing. Strengths and limitations of different application styles and types. Evolution of applications as responses to social computing challenges. Information and organizational systems co-development.
Prerequisite: INFM603 and INFM605; or (LBSC602 and LBSC671); or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM741 or INST741.
Formerly: INFM741.

INST742 Implementing Digital Curation (3 Credits)
Management of and technology for application of digital curation principles in specific settings. Characteristics, representation, conversion, and preservation of digital objects. Application of standards for digitization, description, and preservation. Planning for sustainability, risk mitigation and disaster recovery.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST744 Solving Problems in Digital Curation - Capstone Course (3 Credits)
Project-based course that applies digital curation principles and techniques first-hand in an institutional program setting. The focus is on a well-defined project that constitutes a learning experience and also permits the student to contribute to the ongoing work of the host institution. The project must address one or more aspects of digital curation: design and implementation for long-term digital curation of a discrete collection; application of technologies and standards for digitization, description, and preservation of digital assets; or implementation of strategies to provide access to a digital collection.
Restriction: Must be enrolled in the Curation and Management of Digital Assets (CMDA) Certificate.

INST745 Introduction to Digital Arts Curation (3 Credits)
Representation and curation of art artifacts through digital media, with a focus on how to collect and manage born-digital artifacts, digitized artifacts, and their related data and metadata.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST746 Digitization of Legacy Holdings (3 Credits)
Through hands on exercises and real-world projects, students will learn how to incorporate digitization of analog holdings into an existing archival program and how to link records of different formats and from different collections together.
Prerequisite: INST604.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST728B or INST746.
Formerly: INST728B.

INST747 Research in Advanced Digital Curation (3 Credits)
Students will build their ability to understand the complexity of research strategies and apply tools involved in the management and use of digital information in the Age of Big Data. The class will contain class lectures, class discussions, assigned readings, and extensive hands-on experience with student experience in digital curation projects. The research projects are focused around six major themes that will engage students in multiple arenas of research in Big Data. These are: community displacement, refugee narratives, movement of people, citizen internment, racial zoning, and cyberinfrastructure for digital curation. Project participants will have the opportunity to work with external stakeholders.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST728L or INST747.
Formerly: INST728L.

INST750 Advanced Data Science (3 Credits)
Application of data science techniques to unstructured, real-world datasets including social media and geo-referenced sources. Techniques and approaches to extract information relevant for experts and non-experts in areas that include smart cities, public health, and disaster management.
Prerequisite: INFM603 and INST737; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INFM750 OR INST750.
Formerly: INFM750.

INST751 IoT and Streaming Data Analytics (3 Credits)
An increasing number of sensors, actuators, Internet-connect instruments and apparatuses, smart devices, and systems are generating and broadcasting a wide variety of continuous data streams. Machine-generated structured data sources are joined by a myriad of unstructured data streams from social media, weather, and news sources, among others. Integrated into networks, these continuously-streaming devices (collectively referred to as the Internet of Things, or IoT) provide a fertile array of data sources that can be ingested and analyzed to inform and automate decision processes for numerous purposes including operational intelligence, process monitoring, optimization, risk management, personalization, and prediction in real time. This course looks at architectures and operational modes for streaming data sources and examine methods for descriptive analytics, creation of predictive models, and integrated deployment of these models via centralized and edge computing resources. We will discuss a variety of uses cases for streaming data analytics and how they are applied in different industries including public utilities, smart cities, manufacturing, telecommunications, and healthcare.
Prerequisite: INFM603, INST733, or other programming and database courses, or Permission of the instructor.

INST752 Location Intelligence (3 Credits)
Provides a comprehensive overview of the principles of geographic information systems and location analytics for a variety of business scenarios. Explores the processes for integrating location information, maps, and demographic information with business information and implementing analytical applications. Reviews business contexts such as government and citizen analysis, zoning and planning, retail site selection, supply chain management and logistics, fieldservice planning and tracking, real estate, insurance, public safety, municipal maintenance, and others. Provides hands-on opportunities to apply location intelligence methods.
Prerequisite: INFM600, INFM603, INST630, and INST733; or permission of INFO-College of Information Studies.

INST753 Data Governance and Data Quality (3 Credits)
Surveys the methods and practices for understanding the relationship between organizational performance objectives and their effective oversight, use, and management of information. Examines methods for instituting information governance, data governance, and data quality in the context of information policies for assessing information risk, observing data policies, and enforcing accountability for protection of sensitive information. Explores models of data ownership and accountability, roles and responsibilities for data governance and data stewardship, and processes for soliciting and documenting information and data requirements. Covers techniques for data quality assessment, specification of data quality rules, and applications for validating compliance with data quality expectations, monitoring levels of data quality, and notifications and dashboards for monitoring data compliance.
Prerequisite: INFM600, INFM603, and INST733; or permission of INFO-College of Information Studies.

INST754 Data Integration and Preparation for Analytics (3 Credits)
Provides a comprehensive overview of the end-to-end processes for acquiring, ingesting, managing, cleansing, transforming and integrating data sources for the purposes of reporting andanalytics. Concepts include data acquisition, data streaming, data staging, standardization, data quality, concept and metadata harmonization, transformation, and data modeling. Students will learn how ingested data sets can be transformed, integrated, and prepared for analytical use.
Prerequisite: INFM600, INST630, and INST733; and (INFM603 or JOUR652) ; or permission of INFO-College of Information Studies.

INST755 eGovernment for Smart Cities (3 Credits)
Federal, state, and local government entities are increasingly communicating, interacting, and providing services digitally in an online and networked environment. Concurrently, urban planners and administrators seek to leverage the potential of rapidly evolving technologies to transform service provisioning for the efficient management of assets and resources, with the goal of creating sustainable, livable, innovative, and economically vibrant cities and communities. This course will examine the intersection of these two developments and provide a framework for understanding the technical, policy, and information management issues that are emerging.

INST756 Information Risk Management (3 Credits)
Looks at information system threats, vulnerabilities, risk assessment and management. Explores how regulations scope and define what is considered to be protected information. Considers how data assets are assessed and classified in terms of their levels of sensitivity. Discusses specifying data protection policies and the techniques for enforcing compliance with those policies.
Prerequisite: INFM600; or permission of INFO-College of Information Studies.

INST760 Data Visualization (3 Credits)
Introduction to the science and technology of data visualization--the graphical representation of data to aid understanding--and includes both theoretical foundations as well as practical applications of integrated visualization techniques on real-world problems. Application of these techniques to state-of-the-art problem domains within research, society, and industry.
Prerequisite: INST630; or INFM603; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST760 or INST728V.
Formerly: INST728V.

INST762 Visual Analytics (3 Credits)
Visual analytics is the use of interactive visual interfaces to facilitate analytical reasoning. In essence, visual analytics is based on the--not uncontroversial--idea that humans and computers working alone are insufficient for the data challenges of today and tomorrow, and that effective synthesis of both humans and computational algorithms are needed to create human-in-the-loop systems. Thus, visual analytics bridges human-centered disciplines such as visualization and human-computer interaction with computation-centered disciplines such as machine learning, probabilistic methods, and knowledge discovery. The course contents will include both theoretical foundations of this interdisciplinary science as well as practical applications of integrated visual analysis techniques on real-world problems.
Prerequisite: INFM603, INST630, or JOUR652; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: INST728Q OR INST762.
Formerly: INST728Q.

INST765 Programming on the Web (3 Credits)
Non-programmers will learn basic programming and how to develop familiarity with web formatting and programming paradigms, including XML, REST, APIs, and authentication schemes. The class begins with an introduction to basic programming and students build on those skills by programming applications that use web-based data and services.
Prerequisite: INFM603, LBSC690, LBSC671, or INST733; or permission of instructor.
Credit Only Granted for: INFM743 or INST765.
Formerly: INFM743.

INST767 Big Data Infrastructure (3 Credits)
Principles and techniques of data science and business intelligence. Technologies and architectures for large-scale data warehousing and scale-out data analytics platforms. Supervised and unsupervised data mining.
Prerequisite: INST737; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

INST770 Information and Preparedness, Response and Recovery in Japan (3 Credits)
Education abroad program in Japan. Examines how individuals and groups respond to disaster through informal and formal practices of community resilience and recovery. Focuses on Japanese uses of information for these purposes, including storytelling, game-based learning, social media, archives, and memorials. Examines Japanese principles of community and kizuna ("connectedness"). Includes 2 weeks of pre-departure online course in the US, 1 week of study and travel in Japan over spring break, and 2 weeks of post-return online coursework in the US.
Credit Only Granted for: INST370 or INST770.

INST771 Foundations of Cybersecurity (3 Credits)
Explores the foundational concepts of cybersecurity including the Threat Landscape, the evolution and structures of the global telecommunications network, key communication protocols and foundations of networks, the history, culture and emergence of the hacking process, and the core motivations and tactics of threat actors.

INST772 Policy and Practice of Ethical Hacking (3 Credits)
Provides students with an understanding of the ethical frameworks and technical approach in the conduct of penetration testing and ethical hacking. Students will work with real systems in real environments and will leverage real vulnerability analysis and exploitation tools in a live environment. Upon completion, students will understand the overall concepts guiding penetration testing from a practical, hands-on vantage point.
Prerequisite: Must have completed or be concurrently enrolled in INST771.

INST773 Cyber Intelligence Fundamentals (3 Credits)
Provides students with an understanding of how to identify, track, and report on malicious activity. Students will learn to identify and work with malware and network data and pair it with a broader set of threat intelligence information to draw conclusions based on the totality of open source information and network intelligence. Students will gain a in depth understanding of the principles of cyber threat intelligence and techniques applied in the cyber threat industry. Students will engage in in-depth discussion and practice in evaluating and interpreting indicators of compromise, command and control, and artifacts left by malicious actors.
Prerequisite: INST771.

INST775 HCIM CAPSTONE PREP (3 Credits)
Students will define a project, which requires a high level of background research, rigor in execution and evaluation, and documentation. Capstone projects may follow the design, prototyping and evaluation process from end-to-end or may focus on a subset of elements in that process, such as formative study and design.
Prerequisite: INST631, INST632, and INST717; and must have completed Research Methods; and permission of INFO-College of Information Studies. Or permission of instructor.
Restriction: Must be taken in the fall semester of the year in which the student plans to graduate; and permission of INFO-College of Information Studies.

INST776 HCIM CAPSTONE PROJECT (3 Credits)
The opportunity to apply the skills learned through coursework in a semester-long project applied to a real -world problem. Capstone projects may follow the design, prototyping and evaluation process from end-to-end or may focus on a subset of elements in that process, such as formative study and design.
Prerequisite: INST775; or permission of instructor.
Restriction: Must be taken in the semester immediately following completion of INST775 HCIM Capstone Prep; and permission of INFO-College of Information Studies.

INST779 Readings Seminar (1 Credit)
Readings in emerging topics. Through readings and discussion the class will critically assess future directions and highlight intersection points with other disciplines (e.g., medicine) and sub-disciplines of information studies and computer science (e.g., information retrieval, computer vision, machine learning). One or more themes will be covered over the semester (e.g., inclusive design, health informatics, environmental sustainability, social networking) and will be chosen based on instructor and student interest.
Restriction: Permission of INFO-College of Information Studies.
Repeatable to: 3 credits if content differs.
Credit Only Granted for: INST779, INST728J.
Formerly: INST728J.

INST782 Arrangement, Description, and Access for Archives (3 Credits)
Introduction to the key concepts and practices involved with arrangement and description of archives, and the techniques appropriate to enable users to access archival information in traditional and nontraditional archival contexts.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC684, LBSC781, LBSC782, or INST782.
Formerly: LBSC684, LBSC781, and LBSC782.

INST784 Digital Preservation (3 Credits)
Issues and practices regarding digitization of analog materials and preservation of digital materials, both digitized and born digital.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC784 or INST784.
Formerly: LBSC784.

INST785 Documentation, Collection, and Appraisal of Records (3 Credits)
Development of documentation strategies and plans; collecting policies to guide programs in acquiring records; theories and techniques for appraising records to identify those with continuing value.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC785 OR INST785.
Formerly: LBSC785.

INST794 Capstone in Youth Experience (3 Credits)
Through a supervised project, to synthesize design thinking, participatory design, connected learning, and learning theory/frameworks students will produce a technology-infused program for and with youth. Students will develop and carry out a project with a community partner through their library system. The project must incorporate technology and design thinking, and must be based on one or more learning theory/frameworks. Through the course, students will learn many practical skills related to planning and implementation of a technology-infused programming at or through their library, including marketing, fundraising, budgeting, legal issues, logistical issues, developing and sustaining community partnerships, developing engaging experiences for youth, and creating and analyzing learning assessments.
Prerequisite: INST650, INST651, and INST652; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies; and must be part of Youth Experience (YX) certificate program.

INST799 Master's Thesis Research (1-6 Credits)
Repeatable to: 99 credits.

INST800 The Engaged Intellectual: An Introduction to Research and Academic Work (3 Credits)
An introduction to the academic life with a particular focus on what it means to undertake research, teaching, and service.
Restriction: Permission of INFO-College of Information Studies; and restricted to students in Ph.D. in Information Studies (INFS) program.

INST802 Pragmatic and Methodological Foundations for Information Studies (3 Credits)
Information Studies' eclectic interdisciplinarity is both its greatest strength and its most significant weakness. As an increasingly multi/inter/trans/non-disciplinary intellectual community, Information Studies embraces a wide variety of conceptual frameworks, theories, methodological approaches, and intellectual traditions. As such, it is necessary to be able to bring many different intellectual perspectives to bear on the complex, nuanced, phenomena that are its focus. The variety in the intellectual toolbox of Information Studies is central to its ability to avoid reduction of its focal topics to trite, simplistic characterizations. However, the field's paradigmatic richness places particular burdens on the individual researcher. The purpose of this seminar is to help students develop a reflective practice that they can rely on to turn their interests into valuable new insights in an interdisciplinary domain like Information Studies.
Credit Only Granted for: INST888 or INST802.
Formerly: INST888.

INST808 Seminar in Research Methods and Data Analysis (3 Credits)
Topics and issues in information studies research. Design and conduct of research project.
Restriction: Permission of INFO-College of Information Studies. And must be in Information Studies (Doctoral) program; or permission of instructor.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: INST808, LBSC802, or INST802.
Formerly: LBSC802, INST802.

INST809 Individualized Teaching Experience (3-5 Credits)
Introduction to the techniques and challenges associated with design, delivery, and evaluation of couses offered at the University level. The doctoral student will work one-on-one with a faculty member in the development and co-teaching of a graduate level course.
Prerequisite: Must have completed 18 credit hours of doctoral course work.
Restriction: Permission of INFO-College of Information Studies; and permission of instructor.
Repeatable to: 6 credits.
Credit Only Granted for: INST809, LBSC774, INST728G.
Formerly: INST728G.

INST811 Pedagogy and Curriculum Development (3 Credits)
In this course, doctoral students will gradually and iteratively build a syllabus for an original course related to Information Studies. The course will cover, in sequence: curriculum models and development; learning outcome development; syllabus development; classroom management and dynamics; design of student assessments; design and delivery of classroom lectures; discussion moderation; working with teaching assistants; hybrid and online pedagogy; learning outcomes assessment; course evaluations; and teaching statements. Upon completion of the course, students will have a fully developed teaching portfolio.

INST818 Individual Research Experience (1-3 Credits)
Pre-candidacy individual research experience directed by a faculty member.
Repeatable to: 3 credits.

INST878 Special Topics in Information Studies (3 Credits)
Seminar topics offered as faculty and student interests warrant. Topic varies.
Restriction: Permission of INFO-College of Information Studies. And must be in Information Studies (Doctoral) program; or permission of instructor.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: INST878 or LBSC878.
Formerly: LBSC878.

INST888 Doctoral Seminar (3 Credits)
Advanced seminar on selected topics in information studies.
Restriction: Must be in Information Studies (Doctoral) program; and permission of INFO-College of Information Studies.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: INST888 or LBSC888.
Formerly: LBSC888.

INST898 Pre-Candidacy Research (1-8 Credits)

INST899 Doctoral Dissertation Research (1-8 Credits)

ISRL - Israel Studies

ISRL448 Seminar in Israel Studies (3 Credits)
Intensive study of an Israel Studies topic. Expected work product is a substantial research or analysis paper or appropriate equivalent.
Recommended: ISRL349 and ISRL249.
Restriction: Must be in the Israel Studies Minor.

ISRL449 Advanced Topics in Israel Studies (3 Credits)
Topics in the study of Zionism and contemporary Israel from the 1880s to the present at the advanced level. Individual sections may address history, politics, or culture. Some Sections may have language or course prerequisites.
Recommended: ISRL349 or ISRL249.
Repeatable to: 6 credits if content differs.

ISRL499 Advanced Independent Study in Israel Studies (1-3 Credits)
This upper-level independent study allows students to work closely with an Israel Studies faculty member of their choice, pending prior approval of the faculty member. In this independent study, students will focus on a topic specific to Israel Studies.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 6 credits.

ISRL618 Graduate Seminar in Israel Studies (3 Credits)
An exploration of aspects of the history, politics, society, or culture of Modern Israel. Topics will vary.
Restriction: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ISRL628 Special Topics in Israeli History (3 Credits)
An exploration of aspects of the history of Modern Israel. Topics will vary.
Restriction: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ISRL638 Special Topics in Israeli Politics (3 Credits)
An exploration of aspects of Israeli politics. Topics will vary.
Restriction: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ISRL648 Special Topics in Israeli Society (3 Credits)
An exploration of aspects of Israeli society. Topics will vary.
Restriction: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ISRL658 Special Topics in Israeli Culture (3 Credits)
An exploration of aspects of Israeli culture. Topics will vary.
Restriction: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ISRL699 Independent Study in Israel Studies (3 Credits)
This graduate-level independent study allows graduate students to work closely with an Israel Studies faculty member of their choice, pending prior approval of the faculty member. In this independent study, graduate students will focus on a topic specific to Israel Studies.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

ITAL - Italian

ITAL401 Advanced Composition and Style (3 Credits)
Advanced writing practice in range of genres.
Prerequisite: ITAL301; or students who have taken courses with comparable content may contact the department.

ITAL411 Monsters and Demons: the Faces of Evil in Dante's Inferno (3 Credits)
An interdisciplinary study of Dante's Inferno as represented in the Divine Comedy. Special emphasis on Dante's own portrayal of monsters and demons and their roles in the poet's eschatological vision of Hell.Taught in English

ITAL421 The Italian Renaissance (3 Credits)
A study of major trends of thought in Renaissance literature, art, and science. Taught in English.
Credit Only Granted for: ITAL421 or ITAL422.

ITAL431 Italian Civilization in Translation (3 Credits)
Political, social, intellectual, literary and artistic forces shaping contemporary Italy from the late Middle Ages to the present. Taught in English.
Credit Only Granted for: ITAL431 or ITAL432.

ITAL433 Holocaust in Italian Literature and Cinema (3 Credits)
Review of literature and theoretical writings of Italy's most famous survivor, Primo Levi, to a sampling of Italian films that focus in vastly different and often extremely controversial ways on the experience of the concentration camp, while addressing a series of central questions from the brutal realities of the camps to the "compromises" made in order to survive, the need to bear witness, and the idea of the survivor's guilt.Cross-listed with: CINE433.
Credit Only Granted for: CINE433, FILM433 or ITAL433.
Formerly: FILM433.

ITAL436 Italian Cinema I: Neorealism (3 Credits)
Explores representations of Italy in cinema with special focus on identity formation and the movement of Italian neorealism and post neorealism. Taught in English.Cross-listed with: CINE441.
Credit Only Granted for: CINE441, FILM441 or ITAL436.
Formerly: FILM441.

ITAL469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

ITAL471 Italian Cinema: A Cultural Approach in Translation (3 Credits)
The culture of Italy through the medium of film from the silent days up to the present. Taught in English.
Credit Only Granted for: ITAL471 or ITAL472.

ITAL473 Italian Cinema II (In Translation) (3 Credits)
A study of Italian society and culture through the medium of film from the mid 1970's to the present. Taught in English.Cross-listed with: CINE431.
Credit Only Granted for: ITAL473, CINE431 or FILM431.
Formerly: FILM431.

ITAL475 The Italian Opera Libretto in English (3 Credits)
History and analysis of Italian opera librettos from Monteverdi through Mozart to Verdi and Puccini. Taught in English.
Prerequisite: Must have completed one course in literature.
Credit Only Granted for: ITAL475 or ITAL476.

ITAL478 Colloquium in Italian (1 Credit)
Colloquium section taught in Italian to accompany 400-level Italian courses taught in English. Discussion, presentations, readings.
Prerequisite: ITAL311; or students who have taken courses with comparable content may contact the department.
Corequisite: ITAL498, ITAL411, ITAL431, ITAL421, ITAL473, ITAL475, ITAL471, or ITAL499.
Repeatable to: 6 credits.

ITAL497 Senior Project (3 Credits)
Individual independent study of an aspect of Italian literature, culture or society selected according to student interest and need in consultation with a member of the Italian program.
Prerequisite: 4 courses from ITAL400-499 course range; or permission of ARHU-School of Languages, Literatures, and Cultures department.

ITAL498 Special Topics in Italian Literature (3 Credits)
Repeatable to: 6 credits if content differs.

ITAL499 Special Topics in Italian Studies (3 Credits)
Repeatable to: 6 credits if content differs.

JAPN - Japanese

JAPN401 Readings in Modern Japanese Literature (3 Credits)
Development of advanced reading, vocabulary, grammar, and translation skills through selected readings in Japanese drawn primarily from modern literature.
Prerequisite: Minimum grade of C- in JAPN302; or permission of instructor.

JAPN402 Readings in Japanese Cultural Studies (3 Credits)
Development of advanced reading, vocabulary, grammar, and translation skills through selected readings in Japanese drawn from the fields of history, social sciences, cultural studies, film studies, and popular culture.
Prerequisite: Minimum grade of C- in JAPN302; or permission of instructor.

JAPN407 The Art of Translation (3 Credits)
Theory and practice of translation. Variety of genres. Japanese to English.
Prerequisite: 1 course with a minimum grade of C- from (JAPN401, JAPN402); or students who have taken courses with comparable content may contact the department.

JAPN408 Special Topics in Japanese (3 Credits)
Topic in the Study of Japanese, to be announced each time course is offered. Taught in Japanese.
Prerequisite: Minimum grade of C- in JAPN302; or permission of instructor.

JAPN412 Classical Japanese (3 Credits)
Continuation of JAPN 411 with more advanced classical Japanese.
Prerequisite: JAPN411.

JAPN418 Japanese Literature in Translation (3 Credits)
Representative works of Japanese literature in translation.
Repeatable to: 9 credits if content differs.

JAPN421 History of the Japanese Language (3 Credits)
Investigation of the origin of the Japanese language, its relationship with other languages, and its development. Taught in English, but presumes knowledge of Kanji (Chinese characters).
Prerequisite: JAPN102; or permission of ARHU-School of Languages, Literatures, and Cultures department.

JAPN422 Introductory Japanese Linguistics (3 Credits)
An investigation of Japanese sound patterns and syntax through a comparison with English.

JAPN424 Japan From the Margins (3 Credits)
Japan from the Margins takes as its focus the history and representations of various others in Japanese society. They include ethnic Ainu, Okinawans, and Koreans, a historical outcaste group called the Burakumin, and people marginalized for their non-normative gender and sexual practices. Students learn about the historical specificities of each group as well as their common experiences of institutional discrimination as they grapple with larger questions regarding prejudice, nationalism, and social justice. Taught in English.

JAPN425 The Atomic Bomb in Literature and Memory (3 Credits)
Study of declassified documents and commentary on the United States decision to use the bomb in 1945, the many ways Japanese writers have attempted to express their indescribable experiences in Hiroshima and Nagasaki, and the shaping of historical narratives and national identities in post-war Japan and the U.S. Taught in English.

JAPN428 Seminar in Japanese Discourse and Conversation Analysis (3 Credits)
Presentation and discussion of classic and current readings in English and Japanese on theories and actual practice of discourse and conversation analysis. Students will learn transcription techniques and have an opportunity to apply them in a final term paper.
Prerequisite: JAPN302.
Recommended: JAPN422.
Repeatable to: 6 credits if content differs.

JAPN438 Topics in Japanese Pragmatics (3 Credits)
Basic concepts in the field of pragmatics (the study of language in context) such as deixis and indexicality, speech acts, ellipsis, and politeness. Readings in English on English and Japanese examples.
Prerequisite: JAPN201.
Recommended: JAPN422.
Repeatable to: 9 credits if content differs. Jointly offered with JAPN638.

JAPN445 Performance and Sexuality in Early Modern Japan (3 Credits)
Explores the intersections between performance and sexuality in early modern Japan. Our main sites will be the stage, the brothels, and everyday life as we examine how people of the period performed gender and sexuality. We will draw from popular fiction, kabuki, puppet theatre, woodblock prints, guides to the pleasure quarters, and censorship edicts. Taught in English.
Credit Only Granted for: JAPN498J or JAPN445.
Formerly: JAPN498J.

JAPN447 Technologies of Japanese Performance (3 Credits)
Explores technologies of performance in Japan across the centuries. We will focus on concepts of likeness and liveness as they manifest in performance's mythical origins, the traditions of noh drama, the popular, commercial theatres of kabuki, bunraku, and Takarazuka, and contemporary experiments with robotics, Vocaloids, and other new technologies. Taught in English.
Credit Only Granted for: JAPN498P or JAPN447.
Formerly: JAPN498P.

JAPN498 Special Topics in Japanese Studies (3 Credits)
Special topics in Japanese studies. Taught in English.

JAPN499 Directed Study in Japanese (1-3 Credits)
Prerequisite: Permission of instructor.
Repeatable to: 6 credits if content differs.

JAPN608 Readings in Advanced Modern Japanese (3 Credits)
To improve reading and translation skills; readings from newspaper articles, literary works, and academic publications in the social sciences and humanities. Listening exercises are included.
Prerequisite: JAPN402; or students who have taken courses with comparable content may contact the department; or permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

JAPN619 Topics in Modern Japanese Literature in Translation (3 Credits)
Current topics in modern Japanese literature in English translation.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 9 credits if content differs.

JAPN628 Seminar in Japanese Discourse and Conversation Analysis (3 Credits)
Presentation and discussion of classic and current readings in English and Japanese on theories and actual practice of discourse and conversation analysis. Students will learn transcription techniques and have an opportunity to apply them in a final term paper.
Prerequisite: JAPN302.
Recommended: JAPN422.
Repeatable to: 6 credits if content differs.

JAPN638 Topics in Japanese Pragmatics (3 Credits)
Basic concepts in the field of pragmatics.
Prerequisite: JAPN201.
Repeatable to: 9 credits if content differs. Jointly offered with JAPN438.

JAPN679 Special Topics in Japanese Linguistics (3 Credits)
Current topics in research in Japanese linguistics.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 9 credits if content differs.

JOUR - Journalism

JOUR400 Media Law (3 Credits)
Legal rights and constraints of mass media; libel, privacy, copyright, monopoly, contempt, and other aspects of the law applied to mass communication. Previous study of the law not required.
Prerequisite: JOUR320, JOUR360, or JOUR501.
Restriction: Junior standing or higher.

JOUR402 Journalism Law and Ethics (3 Credits)
An examination of the legal rights and ethical problems and constraints of mass media, including libel, privacy, copyright, monopoly and contempt.
Prerequisite: JOUR201.
Credit Only Granted for: JOUR402 OR JOUR400 and JOUR300.

JOUR405 Breaking News With Numbers: Statistics for Journalists (3 Credits)
Common statistical tools, software and data visualization techniques will be used to allow students to analyze data and solve problems relevant to reporting and writing about politics, sports, criminal justice, business and other fields.
Prerequisite: Minimum grade of C- in JOUR201; and (MATH107 or MATH110; or must have completed a higher level math course).
Restriction: Must be in a major in JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: BIOM301, BMGT230, CCJS200, ECON230, EDMS451, GEOG306, GEOL351, GVPT422, INST314, JOUR405, PSYC200 or SOCY201.

JOUR434 Salzburg Seminar: Global Media Literacy (3 Credits)
An advanced analysis of the information, values underlying messages conveyed via television, newspapers, the Internet, magazines, radio and film from a cross-cultural perspective. Examines the accuracy of messages and explores how distinctive global media shape views of politics culture and society with nations, across regions and internationally.
Restriction: Must be in Salzburg Academy program. Jointly offered with JOUR734.
Credit Only Granted for: JOUR434 or JOUR734.

JOUR435 Salzburg Seminar: Global Change, Global Cooperation (3 Credits)
Practical and theoretical examination of a global problem (or problems) of contemporary importance from a cross-cultural, perspective. Analytical framework used to examine how media shape global problems, events and/or issues regionally.
Restriction: Must be in Salzburg Academy program. Jointly offered with JOUR735.
Credit Only Granted for: JOUR435 or JOUR735.

JOUR443 Sports, Society, Culture and the Media (3 Credits)
Designed to explore how sports, society, culture and the media critically relate to each other and the vast audiences of fans and interested parties. Students will study how journalists impact change; how sports shape culture; and how sports are seen throughout the world. College sports, children and sports, the business of sports, the history of sports media and the future of sports in society will be studied as well.
Restriction: Junior standing or higher.
Credit Only Granted for: JOUR459G or JOUR443.
Formerly: JOUR459G.

JOUR451 Advertising and Society (3 Credits)
Advertising as an institution with manifest economic purposes and latent social effects. Influences of advertising on people, and related issues of ethics and social responsibility.
Restriction: Junior standing or higher.

JOUR452 Women in the Media (3 Credits)
Participation and portrayal of women in the mass media from colonial to contemporary times.Cross-listed with: WGSS452.
Credit Only Granted for: JOUR452, WMST452 or WGSS452.
Formerly: WMST 452.

JOUR453 News Coverage of Racial Issues (3 Credits)
Analysis of news media coverage of issues relating to racial minorities in the United States, with special attention to Hispanics, Asian Americans, African Americans and Native Americans.
Restriction: Junior standing or higher.

JOUR455 Media Entrepreneurship (3 Credits)
Basic business and entrepreneurship concepts will be covered and will explore how technology is transforming the business of media. Students develop and pitch ideas for media businesses, learn startup basics, do exercises in Internet advertising and business plan analysis, use social networks and other digital communication tools, and perform other hands-on exercises in business development and presentation.
Credit Only Granted for: JOUR459E or JOUR455.
Formerly: JOUR459E.

JOUR456 Literature in Journalism (3 Credits)
From Truman Capote's In Cold Blood to Mark Bowden's Black Hawk Down, students will examine how literary works can help writers approach a subject in a different way than more traditional forms of journalism, including the advantages and limitations of the style.
Credit Only Granted for: JOUR456 or JOUR673.

JOUR458 Special Topics in Journalism (3 Credits)
Issues of special concerns and current interest.
Repeatable to: 6 credits if content differs.

JOUR459 Special Topics in Journalism (1-3 Credits)
Issues of special concern and current interest. Open to all students.
Repeatable to: 6 credits if content differs.

JOUR462 Professional Seminar in Public Affairs Reporting (3 Credits)
Explore theoretical and practical issues in the press coverage of governments. Examine the complex press-government relationship.
Prerequisite: Permission of JOUR-Philip Merrill College of Journalism.

JOUR472 Data Journalism (3 Credits)
A practical, skills-based course in the basics of modern data journalism, data analysis and data storytelling. Students will learn to use data programming, statistical analysis, visualization tools and investigative reporting techniques to unearth key facts, patterns and proof in storytelling.
Prerequisite: JOUR320 or JOUR360. Jointly offered with JOUR772.
Credit Only Granted for: JOUR472 or JOUR772.

JOUR473 Computational Journalism (3 Credits)
Designed to teach the application of computational methods in journalism and reporting. The methods include natural language processing, visualization, and web data mining. The course will also cover the necessity and impact of journalistic ethics in designing computation solutions.
Prerequisite: Permission of the Philip Merrill College of Journalism. Cross-listed with: INST403. Jointly offered with: JOUR773.
Credit Only Granted for: JOUR479V, JOUR473, INST408I or INST403.
Formerly: JOUR479V and INST408I.

JOUR475 Understanding Audiences and Analytics (3 Credits)
As journalism evolves, it may be more important than ever to understand what were once simply called "audiences" -- who they are, how they consume news, and what that engagement means for them and for society. Students will learn to think critically about news audiences and contemporary issues in audience research.
Prerequisite: Student must have completed a university statistics course.
Credit Only Granted for: JOUR479O or JOUR475.
Formerly: JOUR479O.

JOUR476 Researching Emerging Media in Journalism: Past, Present and Future (3 Credits)
Students will examine developments billed as innovative in the current technology-laden news ecology -- such as social media, mobile reporting and virtual reality -- and the blurring of lines between hard news, informed opinion and advocacy. While questions about the future cannot be answered with any certainty, an exploration of the past allows us to see what happened when new technologies, information systems and practices appeared as possible tools for use by journalists and the communities they served. Students will learn to use resources for researching emerging media, including UMD library databases and open access sources. The course will include presentations by the instructor, discussions, field trips, in-class exercises and student presentations. Each student will engage in a research project to understand the experience of emerging media in a decade between 1820 and 1980. Students will also write an essay contemplating current trends and the future of emerging media.
Prerequisite: Must have completed a university statistics course.
Credit Only Granted for: JOUR479W or JOUR476.
Formerly: JOUR479W.

JOUR479 Special Topics in Data Gathering and Analysis (1-3 Credits)
Special research topics for reporting and writing.
Repeatable to: 3 credits.

JOUR480 Capstone Colloquium: The Business of News (1 Credit)
Students will learn the basic news business concepts and examine how revenue and cost structures for media businesses are evolving in new directions. Topics include basic principles and concepts that drive media businesses in the Internet age, including revenue sources, dynamics of online advertising and subscriptions, mobile media strategies, user metrics, engaging audiences, and market dynamics.
Restriction: Must be in a major in JOUR-Philip Merrill College of Journalism; and junior standing or higher; and permission of JOUR-Philip Merrill College of Journalism.

JOUR601 Theories of Journalism and Public Communication (3 Credits)
Survey and evaluation of current communication theories. Attention is given to the nature and function of scientific theory, models of communication behavior, the nature of information, social functions of journalism and public communication, attitude change and persuasive communication and theories of language and meaning.
Prerequisite: Permission of JOUR-Philip Merrill College of Journalism.

JOUR603 News Videography (3 Credits)
Introduction to shooting, editing and production of video stories for broadcast and the Web; includes newsgathering in the field.
Prerequisite: JOUR504; and permission of Journalism College required.
Restriction: Permission of JOUR-Philip Merrill College of Journalism. Jointly offered with JOUR262.
Credit Only Granted for: JOUR503 or JOUR603.
Formerly: JOUR503.

JOUR604 Introduction to Multimedia Skills for Graduate Certificate Programs (3 Credits)
Examine the basics of producing and editing digital photos, video and audio for news. Topics include framing, lighting and other aspects of composition; sequencing, using wide, medium and tight shots; and ethical considerations when collecting sound and visuals.
Restriction: Permission of JOUR-Philip Merrill College of Journalism; and must not have completed JOUR504.
Credit Only Granted for: JOUR 604, JOUR504, or JOUR628G.
Formerly: JOUR628G.
Additional Information: This course is for students enrolled in graduate certificate programs in the College of Journalism.

JOUR610 Seminar in Mass Media History (3 Credits)
Analysis and discussion of the interrelationships between the mass media and society, including various social and cultural elements of modern society; responsibilities of the mass media and the mass communicator.
Credit Only Granted for: JOUR610 or JOUR710.
Formerly: JOUR710.

JOUR620 Public Affairs Reporting (3 Credits)
Designed to add to and sharpen the skills learned in JOUR501. It is primarily an introduction to "beat" reporting that allows students to sample the most common new beats while reporting and writing on deadline. Students are required to develop and hone their multimedia skills by reporting in a variety of media.
Prerequisite: JOUR501; or permission of JOUR-Philip Merrill College of Journalism.

JOUR623 Mobile Journalism (3 Credits)
A review of several mobile applications and the "hands-on" skills needed to collect and share news in the field. First, students learn how to remotely post information to blogs and social networks. Students then learn and practice the latest location-based production techniques using web services on wireless laptops and mobile devices. Students use laptops (and their own "SmartPhone") to record, edit and upload audio and video.
Prerequisite: Students must have basic computer skills.
Credit Only Granted for: JOUR689M or JOUR623.
Formerly: JOUR689M.

JOUR624 Commentary and Editorial Writing (3 Credits)
Journalistic interpretation and analysis; commentary and editorial writing.
Credit Only Granted for: JOUR624 or JOUR628N.
Formerly: JOUR628N.

JOUR625 Advanced Capital News Service Bureau (6 Credits)
Advanced journalism training. Students report as part of College's Capital News Service program.
Prerequisite: JOUR620; and permission of JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: JOUR625 or JOUR729.
Formerly: JOUR729.

JOUR627 Urban Affairs Reporting (3 Credits)
Students are immersed in coverage of issues affecting cities, working on a semester-long multi-platform reporting project based in Baltimore.
Prerequisite: JOUR501; and permission of JOUR-Philip Merrill College of Journalism.
Corequisite: JOUR620; or permission of JOUR-Philip Merrill College of Journalism. Jointly offered with JOUR327.
Credit Only Granted for: JOUR327 or JOUR627.

JOUR628 Specialized Topics in News Writing and Reporting (1-3 Credits)
Advanced training and practice in writing and reporting news. Repeatable to a maximum of six credits provided the content differs.
Credit Only Granted for: JOUR628 or JOUR728.
Formerly: JOUR728.

JOUR634 Audio and Podcast Reporting (3 Credits)
Students will learn the tools needed to report and produce short- and long-form audio storytelling, including writing, reporting, interviewing, production, editing, hosting and delivery. Field reporting and audio gathering outside of class are required, along with writing and mixing broadcast-quality audio stories. The class will produce a complete newscast on deadline, with live and pre-recorded elements. Various interests in audio reporting are welcome and encouraged.
Prerequisite: JOUR660; or permission of Philip Merrill School of Journalism Associate Dean. Jointly offered with: JOUR334.
Credit Only Granted for: JOUR334, JOUR368L, JOUR668L or JOUR634.
Formerly: JOUR668L.

JOUR652 Interactive Design and Development (3 Credits)
Conceptualize, wireframe, design and build responsive Web pages using HTML, style sheets and other coding tools; work with open source interactive tools and JavaScript libraries to create charts, timelines and maps to tell stories.
Corequisite: Offered to students enrolled in the journalism master's degree or certificate. Master's degree students should take JOUR 504 as a pre- or co-requisite. Certificate students are encouraged to take JOUR 604 as a co-requisite.
Restriction: Must be in a major in JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: JOUR652 or JOUR352.

JOUR654 Advanced Interactive Multimedia Storytelling (3 Credits)
Learning and applying Flash and/or other interactive tools to assemble multiple media (i.e. graphics, video, etc.) to create interactive narratives.
Prerequisite: JOUR652; and permission of JOUR-Philip Merrill College of Journalism.

JOUR655 Advanced Online News Bureau (6 Credits)
Advanced online journalism training. Students work as online reporters, editors and producers for a news site. Students also package copy from the print and broadcast news bureaus.
Prerequisite: JOUR603 or JOUR620; and (JOUR504 and JOUR652). Or permission of JOUR-Philip Merrill College of Journalism.

JOUR656 Advanced Kaiser Health Multimedia Reporting (3 Credits)
Advanced reporting on health topics, using traditional and multimedia storytelling tools.
Prerequisite: JOUR504.
Corequisite: JOUR620 or JOUR503.
Restriction: Permission of instructor.

JOUR660 Broadcast News Writing (3 Credits)
Descriptive and critical analysis of broadcast news; methods of evaluation of news judgments; decision-making and organizational aspects of the broadcast news industry.
Prerequisite: JOUR501.
Credit Only Granted for: JOUR660 or JOUR760.
Formerly: JOUR760.

JOUR661 Television Reporting and Production (3 Credits)
Reporting, writing, editing and production of broadcast news.
Prerequisite: JOUR603; or students who have taken courses with comparable content may contact the department.
Restriction: Must not be in Journalism Studies (Doctoral) program.

JOUR662 Broadcast News Producing (3 Credits)
Learn and practice the basics of broadcast newscast producing. Design, write, edit and implement a news program.
Prerequisite: Must have completed or be concurrently enrolled in JOUR661; and (JOUR603 and JOUR660). Jointly offered with JOUR362. Cred it only granted for: JOUR668B or JOUR662.
Formerly: JOUR668B.

JOUR663 Long Form Broadcast Journalism (3 Credits)
Productions of long form broadcast news reporting, reality videos or documentaries.
Prerequisite: JOUR503 or JOUR603; and JOUR661. Or students who have taken courses with comparable content may contact the department. Also offered as: JOUR363.
Credit Only Granted for: JOUR363, JOUR486, or JOUR663.
Formerly: JOUR486.

JOUR664 Advanced Audio and Podcast Reporting (3 Credits)
Students receive professional skills training in the reporting, writing, editing, voicing and production of radio news. Students will be required to do extensive field reporting, along with writing and mixing broadcast-quality radio pieces. They will also participate in other aspects of radio news production, including editing, directing, live interviewing and hosting. By the end of the semester, students will have created all the elements of a complete radio broadcast, including news spots, finished pieces, two-ways and a long-form audio segment. The class will also delve into the history and evolution of radio news and its future in podcasting and other forms.
Prerequisite: JOUR634; or permission of JOUR-Philip Merrill College of Journalism.
Restriction: Permission of JOUR-Philip Merrill College of Journalism. Jointly offered with: JOUR364.

JOUR667 Broadcast News Bureau (6 Credits)
Advanced broadcast journalism training. Students report as part of the College's Capital News Service program.
Prerequisite: JOUR503; or students who have taken courses with comparable content may contact the department. And permission of JOUR-Philip Merrill College of Journalism.

JOUR668 Topics in Broadcasting and Electronic Media (1-3 Credits)
Advance research and analysis of selected topics in broadcast journalism.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: JOUR668 or JOUR768.
Formerly: JOUR768.

JOUR670 Photojournalism (3 Credits)
Examining the basics of shooting, editing and storytelling with still photos taken with 35mm digital cameras. Students shoot portraits, feature photos and action shots. Final project is a photo story/essay.
Prerequisite: JOUR504.
Restriction: Must be in a major in JOUR-Philip Merrill College of Journalism; and permission of JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: JOUR 368P, JOUR 370 or JOUR 670.
Additional Information: Students are required to borrow, rent or purchase a 35mm digital camera. Contact department for camera specifications.

JOUR681 Media Industry Reporting (3 Credits)
Students hone their reporting and writing skills as they produce work for the Web site of an award-winning professional publication, and immerse themselves in the news industry, which is undergoing dramatic transformation in the digital age.
Prerequisite: JOUR501; or permission of JOUR-Philip Merrill College of Journalism.
Corequisite: JOUR620; or permission of JOUR-Philip Merrill College of Journalism.
Restriction: Permission of JOUR-Philip Merrill College of Journalism. Jointly offered with JOUR381. Credit only grant ed for: JOUR381 or JOUR681.

JOUR689 News Coverage of Specialized Topics (1-3 Credits)
Advance training and practice in writing and reporting news in on specialized field of interest.
Prerequisite: JOUR620; or JOUR660.
Repeatable to: 6 credits if content differs.

JOUR698 Special Problems in Communication (1-3 Credits)
Independent study in area of the student's interest.
Repeatable to: 6 credits.

JOUR702 Journalism Law and Ethics (3 Credits)
An examination of the legal rights and ethical problems and constraints of mass media, including libel, privacy, copyright, monopoly and contempt.
Restriction: Must be in one of the following programs (Journalism - Master (Master's); Journalism Studies (Doctoral)) ; or permission of JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: JOUR400, JOUR 600, JOUR700, or JOUR 702.

JOUR722 Mediacentric Politics (3 Credits)
Examination of the growing use of the media image and issues in electorial politics and interest-group advocacy.
Prerequisite: JOUR601.

JOUR725 Political Communication (3 Credits)
Critical examination of the interplay between the media, government and the political process.
Prerequisite: JOUR601 or JOUR801.

JOUR729 Reporting from Annapolis and Washington (6 Credits)
Advanced training in public affairs journalism. Students report state and federal news as part of College's Capital News Service.
Repeatable to: 12 credits if content differs.

JOUR734 Salzburg Seminar: Global Media Literacy (3 Credits)
An advanced analysis of the information, values and underlying messages conveyed via television, newspapers, the Internet, magazines, radio and film from a cross-cultural perspective. Examines the accuracy of messages and explores how distinctive global media shape view of politics, culture and society within nations, across regions and internationally.
Restriction: Must be in Salzburg Academy program. Jointly offered with JOUR434.
Credit Only Granted for: JOUR434 or JOUR734.

JOUR735 Salzburg Seminar: Global Change, Global Cooperation (3 Credits)
Practical and theoretical examination of a global problem (or problems) of contemporary importance from a cross-cultural, perspective. Analytical framework used to examine how media shape global problems, events and/or issues regionally.
Restriction: Must be in Salzburg Academy program. Jointly offered with JOUR435.
Credit Only Granted for: JOUR435 or JOUR735.

JOUR738 Topics in International and Cross-Cultural Communication (3 Credits)
Specialized topics in the fields of comparative journalism and mass communications and in the field of cross-cultural communication.
Repeatable to: 6 credits if content differs.

JOUR762 Professional Seminar in Public Affairs Reporting (3 Credits)
Examination of theoretical and practical issues in the press coverage on government and public affairs.
Prerequisite: JOUR620; and permission of JOUR-Philip Merrill College of Journalism.
Restriction: Must not have completed JOUR462.

JOUR763 Seminar in Newsroom Management (3 Credits)
Organization, operation, and administration of the departments of a newsroom: advertising, business-finance, circulation, news-editorial, personnel, production and promotion.
Credit Only Granted for: JOUR481, JOUR675, or JOUR763.
Formerly: JOUR675.

JOUR772 Data Journalism (3 Credits)
A practical, skills-based course in the basics of modern data journalism, data analysis and data storytelling. Students will learn to use data programming, statistical analysis, visualization tools and investigative reporting techniques to unearth key facts, patterns and proof in storytelling.
Prerequisite: Must have completed or be concurrently enrolled in JOUR501; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: JOUR472 or JOUR772.

JOUR773 Computational Journalism (3 Credits)
Designed to teach the application of computational methods in journalism and reporting. The methods include natural language processing, visualization, and web data mining. The course will also cover the necessity and impact of journalistic ethics in designing computation solutions.
Prerequisite: Permission of the Philip Merrill College of Journalism.
Cross-listed with: INST617. Jointly offered with: JOUR473.
Credit Only Granted for: JOUR779V, JOUR773, JOUR473, JOUR479V, INST617, INST408I, or INST403.
Formerly: JOUR779V.

JOUR775 Quantitative Methods in Journalism and Public Communication Research (3 Credits)
Logic and methods of quantitative data collection and statistical analysis as applied to journalism and public communication studies.
Credit Only Granted for: JOUR701 or JOUR775.
Formerly: JOUR701.

JOUR776 Qualitative Research Methods in Journalism and Public Communication (3 Credits)
Methods of historical, critical and field research in journalism and public communication. Formulation of significant research questions, systematic collection of bibliographic and phenomenal information, formulating substanial claims, organizing and writing research for disciplinary outlets.
Credit Only Granted for: JOUR711 or JOUR776.
Formerly: JOUR711.

JOUR777 Advanced Historical/Critical Methods in Journalism and Public Communication (3 Credits)
Critical assessment of qualitative approaches to public communication. Introduction to significant schools of historical and critical research. Advanced techniques for inquiry and manuscript preparation. Students must have a dissertation research project requiring historical or critical theory.
Credit Only Granted for: JOUR712 or JOUR777.
Formerly: JOUR712.

JOUR779 Seminar in Research Problems (1-3 Credits)
Methods of research design and analysis in specialized areas of journalism and public communication research.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: JOUR779 or JOUR780.
Formerly: JOUR780.

JOUR798 Master's Professional Fieldwork (1-6 Credits)
Research for and preparation of news articles or programs for use in the media. Analysis of fieldwork experience using communication theory and research results. Fieldwork may be done independently or as an internship. Repeatable to a maximum of six credits.
Repeatable to: 6 credits.

JOUR799 Master's Thesis Research (1-6 Credits)

JOUR800 Introduction to Doctoral Study in Journalism and Public Communication (3 Credits)
Basic skills in journalism and public communication research.
Credit Only Granted for: JOUR700 or JOUR800.
Formerly: JOUR700.

JOUR801 Advanced Public Communication Theory (3 Credits)
Advanced selected survey of communication & media theory.
Prerequisite: JOUR601, or students who have taken courses with comparable content may contact the department.

JOUR808 Doctoral Colloquium (1-3 Credits)
Guided discussion of professional and theoretical topics.
Prerequisite: Must have completed or be concurrently enrolled in JOUR800.
Repeatable to: 4 credits if content differs.

JOUR818 Seminar in Communication Theories and Journalism Practice (3 Credits)
Critical examination of existing theory and/or journalism practices suggesting hypotheses and formulating proposals for future research.
Prerequisite: Must have completed or be concurrently enrolled in JOUR800.
Repeatable to: 6 credits if content differs.

JOUR888 Doctoral Professional Field Work (1-9 Credits)
Critical analysis of a phase of a professional field in journalism and public communication. Analysis of professional activity through personal observation. Evaluation of the purpose, process, effectiveness, and efficiency of professional activity. Recommendations for training and further research.
Repeatable to: 9 credits if content differs.
Formerly: PCOM888.

JOUR889 Doctoral Tutorial in Journalism and Public Communication (1-9 Credits)
Individual research in journalism and public communication.
Repeatable to: 9 credits if content differs.
Formerly: PCOM889.

JOUR898 Pre-Candidacy Research (1-8 Credits)

JOUR899 Doctoral Dissertation Research in Journalism and Mass Communication (1-8 Credits)
Formerly: PCOM899.

JWST - Jewish Studies

JWST408 Honors Seminar in Jewish Studies (3 Credits)
An in-depth exploration of a theme in Jewish history, literature, culture or thought. Course subject and readings will vary from year to year, but will generally cut across periods, locations, or disciplines. Students are expected to engage the course material critically and to use the seminar as an opportunity to develop an independent research agenda.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Restriction: Junior standing or higher.

JWST409 Research Seminar in Jewish Studies (3-4 Credits)
A capstone course for Jewish Studies. Guides students through advanced source material and subject matter, research skills, and presentation techniques. A substantive paper based on independent research and analysis is one expected outcome.
Prerequisite: Must have completed two upper-level courses in an appropriate area of Jewish Studies; or permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 9 credits if content differs.
Formerly: JWST309.

JWST418 Honors Thesis Research in Jewish Studies (3-6 Credits)
Guided research on a thesis under the supervision of the Jewish Studies faculty.
Repeatable to: 6 credits if content differs.

JWST419 Special Topics in Jewish Studies (3 Credits)
Repeatable to: 9 credits if content differs.

JWST429 Advanced Topics in Jewish Studies (3-4 Credits)
Special topics at an advanced level for Jewish Studies. Primarily intended for majors and graduate students.
Repeatable to: 12 credits if content differs.

JWST430 Dead Sea Scrolls (3 Credits)
A study of the Dead Sea Scrolls in their ancient and modern settings, and in terms of contemporary scholarly interpretations of their meaning. Interpretations of the historical significance of these documents, their connections to ancient Jewish sectarian movements, and their implications for our understanding of Judaism, Christianity, and the history of the Bible.
Prerequisite: Must have completed one JWST course or one RELS course; or permission of ARHU-Meyerhoff Program & Center for Jewish Studies. Cross-listed with RELS430.
Credit Only Granted for: JWST430 or RELS430.

JWST432 Jews in Medieval Times 1000-1450 (3 Credits)
Social and cultural life of Jewish communities spread throughout Islam and Christendom. Major topics include the Gaonate; kehila organization; legal, rationalist, and mystical thought; and the context of rising animosity linked to the Crusades and changing Church doctrines.
Recommended: HIST282, JWST234, HIST330, or HIST331. Cross-listed with H IST476.
Credit Only Granted for: HIST476 or JWST432.

JWST452 The Golden Age of Jewish Philosophy (3 Credits)
Jewish philosophy from Maimonides in the 12th century to the expulsion of the Jews from Spain at the end of the 15th Century. Topics include the limitations of human knowledge, creation of the world, foreknowledge and free will, and the existence of God.
Prerequisite: 3 credits in PHIL courses; or permission of ARHU-Meyerhoff Program & Center for Jewish Studies; or permission of ARHU-Philosophy department. Cross-listed with PHIL417.
Credit Only Granted for: JWST452 or PHIL417.

JWST459 Readings in Medieval Hebrew (3-4 Credits)
Readings and analysis of Hebrew texts and literature from the Middle Ages. Language of instruction in English; all texts in Hebrew.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: JWST459 or JWST466.
Formerly: JWST466.

JWST468 Readings in the Hebrew Bible (3-4 Credits)
Readings in the Hebrew text of the Bible. Emphasis in close reading, grammar analysis, and modern interpretations of the Bible. Language of instruction English; all texts in Hebrew.
Prerequisite: HEBR313; or permission of instructor.
Repeatable to: 9 credits if content differs.
Formerly: HEBR441 and HEBR442.

JWST469 Readings in Rabbinic Hebrew (3-4 Credits)
Readings in classical rabbinic texts and related corpora. Emphasis on grammar and reading skills as well as critical analysis of the material. Language of instruction: English; all texts in original language.
Prerequisite: HEBR313; or permission of instructor.
Repeatable to: 9 credits if content differs.

JWST471 Modern Hebrew Literature in Translation (3 Credits)
An exploration of modern Hebrew prose, poetry, and literary essays written from the 1880s through the present in Europe, Palestine, and Israel. An investigation of the challenges confronting authors such as Mendele Mokher Sforim, Avraham Mapu, Chaim Nahman Bialik, Dvorah Baron, S.Y. Agnon, and David Fogel as they tried to create a contemporary secular literature out of an ancient sacred language. All texts in English translation.

JWST478 Readings in Modern Hebrew (3 Credits)
Variable topics in Modern Hebrew Literature.
Prerequisite: HEBR313; or permission of instructor.
Restriction: Junior standing or higher.
Repeatable to: 12 credits if content differs.

JWST491 Judaism and the Construction of Gender (3 Credits)
The study of Jewish culture, religious practice, communal authority, and literature through the frame of such critical categories of analysis as gender, sexuality, masculinity, power, ethics, and the feminine.
Prerequisite: 1 course in JWST; or 1 course in LGBT; or 1 course in WMST or WGSS. Cross-listed with: WGSS491.
Credit Only Granted for: JWST491, WMST491 or WGSS491.
Formerly: WMST491.

JWST492 Sex, Gender, and Jewish Identity (3 Credits)
An exploration of Jewish embodiment, including dynamics related to biological sex, culturally-framed gender, and sexuality. Topics of discussion may include transgender and intersex Jews, stereotypes and gender performance, modesty, genetics, and body alteration. Focus is on contemporary Jewish culture, framed within the larger historical and textual tradition.
Prerequisite: 1 course in WMST; or 1 course in JWST; or 1 course in LGBT; or permission of instructor. Cross-listed with: LGBT448W, WMST498W.
Credit Only Granted for: JWST492, JWST409G, JWST419W, LGBT448W, or WMST498W.
Formerly: JWST409G and JWST419W.

JWST498 Advanced Language Module for Jewish Studies (1-3 Credits)
A supplementary language module for students enrolled in designated Jewish Studies classes. Language of instruction English, texts in original language.
Prerequisite: HEBR212 or JWST282; or permission of ARHU-Meyerhoff Program & Center for Jewish Studies.

JWST499 Independent Study in Jewish Studies (1-3 Credits)
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 6 credits if content differs.

JWST600 General Seminar in Jewish Studies (3 Credits)
Introduce graduate students to the fields, problems, and basic methods of research in the comtemporary practice of Jewish Studies. Consideration of chronological and historiographical problems, questions of the development of Jewish thought and literature and Jewish religious and cultural history in four rough chronological periods: Biblical Israel, Judaism in Antiquity, Judaism in the Middle Ages and Early Modern Period, and Modern Judaism.

JWST609 Supervised Instruction-Practicum in Jewish Studies (1 Credit)
Supervised instruction or supervised practicum in Jewish Studies. Intended for graduate students whose course work includes field work or classroom teaching.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.

JWST619 Directed Readings in Jewish Studies (3 Credits)
Independent Study in Jewish Studies. Readings and papers.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

JWST648 Readings in Jewish History (3 Credits)
Focus on the central issues in Jewish history as well as the key historiographical debates on those issues.
Repeatable to: 9 credits if content differs.

JWST658 Readings in Jewish Thought and Culture (3 Credits)
Examines key issues in the development of Jewish thought and culture.
Repeatable to: 9 credits if content differs.

JWST678 Readings in Jewish Literature (3 Credits)
Examines selected themes or literatures in the development of Jewish literary traditions.
Repeatable to: 9 credits if content differs.

JWST699 Independent Graduate Readings in Jewish Studies (1-3 Credits)
Independent readings or guided research in a field of Jewish Studies with a member of the Jewish Studies graduate faculty.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 12 credits if content differs.

JWST719 Readings in Jewish Studies (3 Credits)
Course exposes students to significant primary and secondary material on selected topics as well as the major methodological problems covered by professional scholars working on these topics.
Repeatable to: 99 credits if content differs.

JWST799 Masters Thesis Research (1-6 Credits)
Research and Writing the Masters Thesis in Jewish Studies.
Repeatable to: 6 credits.

KNES - Kinesiology

KNES400 The Foundations of Public Health in Kinesiology (3 Credits)
An investigation of the role of physical activity and inactivity in relation to health and well-being through a public health perspective. Past and current perspectives on health promotion, health education, and social policies and approaches will be examined for various populations.
Prerequisite: Minimum grade of C- in KNES287.
Restriction: Senior standing or higher; and must be in a major within the SPHL-Kinesiology department.
Credit Only Granted for: KNES400 or KNES498A.
Formerly: KNES498A.

KNES401 Zip Code: Prediction of Physical Activity & Health (3 Credits)
An exploration of the relationship and impacts of built and other social environments on health, including physical activity, social equity, gentrification, and many others.
Prerequisite: Minimum grade of C- in SPHL100.
Restriction: Must have earned a minimum of 75 credits; and must be in a major within, SPHL-Kinesiology department.
Credit Only Granted for: KNES401 or KNES498A.
Formerly: KNES498A.

KNES402 Biomechanics of Sport (3 Credits)
Mechanical determinants influencing sport techniques. A quantitative, scientific basis for sport analysis with emphasis on the application to numerous sport activities. Evaluation and quantification of the filmed performance of athletes.
Prerequisite: Minimum grade of C- in KNES300.
Restriction: Must be in a major within the SPHL-Kinesiology department; and must have earned a minimum of 75 credits.

KNES405 Principles & Techniques of Manual Muscle Testing (3 Credits)
It is critical for sports medicine and sport performance specialists to understand the location and inter-relationships of the structures of the body that impact human movement. Thus, the primary purpose of this course is to facilitate an in-depth, understanding of the muscles of the body. Specifically, students will learn the origins, insertions, primary and secondary functions, as well as nervous innervations of the major muscle groups of the body. In addition, students will develop palpation skills and learn to grade the function of each muscle through manual muscle testing techniques. These skills form the foundation for assessing functional movement as well as performing safe and effective manual therapy techniques. Thus, while the focus of the class will be to develop sound, introductory palpation and manual muscle testing skills, basic principles of functional movement and manual therapy will also be addressed through hands-on application as well as case study.
Prerequisite: Minimum grade of C- in BSCI201 and BSCI202; and 1 course with a minimum grade of C- from Kinesiology core courses at the 300-level or higher.
Additional Information: This course emphasizes hands-on application of skills. Course participation is critical.

KNES440 Psychology of Athletic Performance (3 Credits)
Examines the psychological factors, mechanisms, and processes in athletic performance. Utilizes a social psychological approach to focus on the study and review of individual performance in both the interpersonal and social context.
Prerequisite: Minimum grade of C- in KNES350.
Restriction: Must have earned a minimum of 75 credits.
Credit Only Granted for: KNES498P, KNES689Z, or KNES440.

KNES442 Psychology of Exercise and Health (3 Credits)
Examines the antecedents and consequences of exerciese behavior. Explores motivation, attitude, control, socialization. Proposes intervention strategies at the individual, organizational and societal levels.
Prerequisite: Minimum grade of C- in KNES350.
Restriction: Must be in a major within the SPHL-Kinesiology department; and must have earned a minimum of 75 credits.
Credit Only Granted for: KNES442 or KNES498O.
Formerly: KNES498O.

KNES445 Exercise and Brain Health (3 Credits)
Examines the evidence for exercise to affect brain function and brain health in children, in adults, and in old age. Covers the adaptations to acute and chronic exercise within brain networks related to emotion, stress reactivity, memory, and executive function, and the effectiveness of physical activity and exercise as treatments for depression, anxiety disorders, and cognitive impairment.
Prerequisite: Minimum grade of C- in KNES350.
Restriction: Must be in a major within the SPHL-Kinesiology department; and must have earned a minimum of 75 credits.
Credit Only Granted for: KNES498C or KNES445.
Formerly: KNES498C.

KNES451 Children and Sport: A Psychosocial Perspective (3 Credits)
Examination of youth sports from a psychosocial perspective, including the impact of highly structured sports on young athletes and the complex social network of coaches, parents and peers.
Prerequisite: Minimum grade of C- in KNES350.
Restriction: Must be in a major within the SPHL-Kinesiology department; and must have earned a minimum of 75 credits.

KNES455 Scientific Bases of Athletic Conditioning (3 Credits)
An examination of physical fitness/athletic conditioning programs stressing the practical application of exercise physiology theory for enhancing athletic performance. Cardiovascular considerations, strength and power development, nutrition, speed, muscular endurance, environmental considerations and ergogenic aids.
Prerequisite: Minimum grade of C- in KNES360.
Restriction: Must be in a major within the SPHL-Kinesiology department; and must have earned a minimum of 75 credits.

KNES457 Managing Youth Programs: Educational, Fitness and Sport (3 Credits)
An examination of the basic functions involved in managing physical education, fitness, and youth sports programs. Focus on leadership skills, organizational management, and techniques for applying learned skills in a variety of organizational settings that serve the nation's youth.
Prerequisite: Minimum grade of C- in KNES350 and KNES370.
Restriction: Must be in a major within the SPHL-Kinesiology department; and must have earned a minimum of 75 credits.
Credit Only Granted for: KNES457 or KNES498Y.

KNES460 Physiology of Aging and the Impact of Physical Activity (3 Credits)
Biology of the aging process in healthy individuals and those with chronic disease, the effects of acute exercise and exercise training on the physiological decline that occurs in humans, and the role that regular physical activity plays on enhancing the quality of life and activities of daily living in individuals.
Prerequisite: 1 course with a minimum grade of C- from (KNES320, KNES360).
Restriction: Must be in one of the following programs (Kinesiology; Public Health Science); and must have earned a minimum of 75 credits.
Credit Only Granted for: KNES498F or KNES460.
Formerly: KNES498F.

KNES461 Exercise and Body Composition (3 Credits)
An in-depth overview on how body composition is measured, what it is composed of, and the physiological and biochemical signals that change it. The effects of acute and chronic exercise on food storage, breakdown, and use as an energy source, is the major focus. This information is applied to important issues in public health and athletic performance.
Prerequisite: 1 course with a minimum grade of C- from (KNES320, KNES360).
Restriction: Must be in one of the following programs (Kinesiology; Public Health Science) ; and must have earned a minimum of 75 credits.

KNES462 Neural Basis of Human Movement (3 Credits)
An introduction to the neural substrates which underlie postural and volitional movement. Neuroanatomical and neurophysiological basis of motor functioning; past and present conceptualizations of motor control and coordination; movement disorders; and maturation of the neuromuscular system.
Prerequisite: Minimum grade of C- in BSCI201, BSCI202, and KNES385; or permission of SPHL-Kinesiology department.
Restriction: Must have earned a minimum of 75 credits.

KNES463 Principles and Methods of Physical Activity Interventions (3 Credits)
Understanding of the planning, implementation, and evaluation of physical activity interventions. Intervention methods and practical strategies fo formulate well-conceived physical activity interventions across a variety of settings and participant populations.
Prerequisite: Minimum grade of C- in KNES350 and KNES360.
Restriction: Must have earned a minimum of 75 credits.
Credit Only Granted for: KNES463 or KNES498G.

KNES464 Exercise Metabolism: Role in Health and Disease (3 Credits)
Examines the role of metabolism in kinesiology, especially as it relates to physical inactivity, health and disease. Includes bioenergetics, substrate utilization, cell signaling, and metabolic gene expression and their impact on chronic health conditions or disease.
Prerequisite: Minimum grade of C- in KNES360.
Restriction: Must have earned a minimum of 75 credits.
Credit Only Granted for: KNES464 or KNES498L.

KNES465 Physical Activity and Disease Prevention and Treatment (3 Credits)
Critically examines the scientific evidence that supports the use of physical activity to prevent and treat age-related diseases, including cardiovascular disease, diabetes, abnormal lipoprotein-lipid levels, hypertension, obesity, osteoporosis and cancer.
Prerequisite: 1 course with a minimum grade of C- from (KNES320, KNES360).
Restriction: Must have earned a minimum of 75 credits.
Credit Only Granted for: KNES465 or KNES498A.

KNES466 Graded Exercise Testing (3 Credits)
Functional and diagnostic examination of the cardiovascular responses to graded exercise testing. Emphasis on electrophysiology, mechanisms of arrhythmias, normal electrical activation of the heart, axis termination and the normal 12-lead electrocardiogram.
Prerequisite: Minimum grade of C- in KNES360.
Restriction: Must be in a major within the SPHL-Kinesiology department; and must have earned a minimum of 75 credits.

KNES467 Genetics in Physical Activity and Sport (3 Credits)
Dedicated to understanding the role of genetics in kinesiology, especially within the contexts of physical activity and sport. Specific genes and phenotypes will be explored.
Prerequisite: Minimum grade of C- in KNES360. And must be concurrently enrolled in STAT100 or have completed STAT100 with a minimum grade of C-; or students who have taken courses with comparable content may contact the department.
Restriction: Must have earned a minimum of 75 credits.
Credit Only Granted for: KNES467 or KNES498Q.

KNES474 Quantitative Methods in Cognitive Motor Behavior - MATLAB (3 Credits)
Includes basic computer programming, algorithm, and quantitative techniques for time-series data with an emphasis on, but not limited to, human movement. These topics will be taught using MATLAB, a programming language and environment for numerical computation, data analysis, and visualization.
Prerequisite: MATH115 or equivalent; or permission of Kinesiology department.
Recommended: MATH240.
Restriction: Must have earned a minimum of 75 credits.
Credit Only Granted for: KNES498Q or KNES474.
Formerly: KNES498Q.

KNES476 Honors Thesis Proposal (3 Credits)
Development of honors thesis proposal based on preliminary research and literature review. Presentation of formal proposal to the thesis committee and fellow honors students.
Corequisite: KNES478.
Restriction: Must be a KNES Honors student; and senior standing.
Credit Only Granted for: KNES476 or KNES498R.

KNES477 Honors Thesis (3 Credits)
Advisement will be on the individual basis. Thesis must be defended in the honors seminar.
Prerequisite: KNES476.
Corequisite: KNES478.
Restriction: Must be a KNES Honors student; and senior standing.
Credit Only Granted for: KNES399 or KNES477.

KNES478 Honors Seminar (1-3 Credits)
Guided discussion of research topics of current interest.
Restriction: Must be a KNES Honors student; and junior standing or higher.
Repeatable to: 4 credits if content differs.
Credit Only Granted for: KNES398 or KNES478.

KNES482 Socio-behavioral Aspects of Human Movement (3 Credits)
Derivation, formulation, and application of research in the socio-behavioral aspects of human movement.
Prerequisite: KNES293, KNES350, and KNES287.

KNES483 Sport Marketing and Media (3 Credits)
Industry practices in sport marketing and media. Marketing strategies and consumer behavior in different sport contexts. Critical examination of selected social and economic issues related to the buying and selling of sport.
Prerequisite: Minimum grade of C- in KNES287.
Recommended: KNES355.
Restriction: Must be in a major within the SPHL-Kinesiology department; and must have earned a minimum of 75 credits.

KNES484 Sporting Hollywood (3 Credits)
Popular representations of sport within the film media related to wider social discourses on bodies and the politics of various categories of subjectivity (gender, sex, race, class and nationality).
Prerequisite: Minimum grade of C- in KNES287 and KNES293.
Restriction: Must be in a major within the SPHL-Kinesiology department; and must have earned a minimum of 75 credits.
Credit Only Granted for: KNES484 and KNES498N.

KNES485 Sport and Globalization (3 Credits)
Examination of sport culture from a global perspective; focuses on theorizing the similarities and differences between various national sporting cultures.
Prerequisite: Minimum grade of C- in KNES287.
Restriction: Must be in a major within the SPHL-Kinesiology department; and must have earned a minimum of 75 credits.

KNES487 Women, Sports and Culture (3 Credits)
A study of the historical barriers to women's participation in physical activity, efforts to dismantle those barriers, and the differentiation that exists in women's sport and physical culture today. Exploration of the historical and contemporary factors involving female athletes in U.S. culture.
Prerequisite: Minimum grade of C- in KNES287.
Restriction: Must be in a major within the SPHL-Kinesiology department; and must have earned a minimum of 75 credits.
Credit Only Granted for: KNES498E or KNES487.

KNES497 Kinesiology Senior Seminar (3 Credits)
Discussions of contemporary issues vital to the discipline, critiques of research in the student's area/areas of special interest, completion of a major project where the student will be asked to demonstrate the ability to carry out investigative processes in problem solving and critical writing under faculty direction.
Prerequisite: A professional writing course with a minimum grade of C-; and must have completed 6 KNES core courses and 2 KNES option courses, all with a C- or higher; and must have completed STAT100 with a C- or better.
Restriction: Senior standing or higher; and must be in Kinesiology program; and permission of department.

KNES498 Special Topics in Kinesiology (3 Credits)
Topics of special interest in areas not covered by regularly scheduled courses.
Prerequisite: Permission of SPHL-Kinesiology department.
Repeatable to: 99 credits if content differs.

KNES600 Kinesiology in Public Health (3 Credits)
A broad introduction to public health within the context of the discipline of kinesiology, focusing on furthering the understanding of the ways kinesiology contributes toward achieving the goals of public health.

KNES601 Epidemiology of Physical Activity (3 Credits)
An exploration of basic epidemiological study design, methods, and health outcomes in the field of physical activity.
Prerequisite: KNES600; and must have completed an undergraduate statistics course (e.g., STAT100 or equivalent).

KNES602 Physical Activity Program Planning and Evaluation (3 Credits)
An in-depth analysis of the planning, implementation, and evaluation of physical activity interventions and programs intended to achieve physical activity and public health goals.
Recommended: KNES600.

KNES603 Mixed Methods in Kinesiology & Public Health Research (3 Credits)
The purpose of this course is to expose students: (1) to some of the key issues involved in physical activity and public health related research, and (2) the process of conducting and communicating research. In addition to learning the central aspects of a range of quantitative and qualitative research methods, students will gain practice evaluating and synthesizing existing research, as well as writing a research proposal specific to a topic of their choice.
Prerequisite: KNES600, KNES601, and KNES602.

KNES604 Development of Posture and Locomotion (3 Credits)
Development of posture and locomotion in humans integrating the perspectives of biomechanics, neurophysiology, perception-action theory and dynamical systems.

KNES609 Research Issues in Kinesiology (1-3 Credits)
Issues, methodologies, and critical analyses of current research in Kinesiology.
Prerequisite: Permission of SPHL-Kinesiology department.
Repeatable to: 6 credits.

KNES610 Methods and Techniques of Research (3 Credits)
Studies methods and techniques of research used in Kinesiology; an analysis of examples of their use; and practice in their application to problems of interest to the student.

KNES612 Qualitative Research Methods in Physical Cultural Studies (3 Credits)
Prepares students to design, prepare, and produce independent research projects in Physical Cultural Studies (PCS). Topics include: the philosophy of PCS through its epistemological, ontological, and axiological bases; the politics of PCS as an interventionist project; and the practice of PCS as critical pedagogy, within research methodologies, and through the ways in which PCS work is analyzed and expressed.

KNES613 Theories Physical Culture (3 Credits)
Examines and assesses numerous social and cultural theories as frameworks for critically interpreting the varied institutions, ideologies, and embodiments of physical culture.
Credit Only Granted for: KNES613 or KNES689I.
Formerly: KNES689I.

KNES614 Cultural Studies and Physical Culture (3 Credits)
Discusses the political commitments, constituents, and complexities of cultural studies, and their relevance for furthering the understanding of physical culture and the project of physical cultural studies.
Credit Only Granted for: KNES614 or KNES689P.
Formerly: KNES689P.

KNES615 The Body, Culture, and Physical Activity (3 Credits)
Critically examines the social constitution and embodied experience of various empirical fields of physical culture, including sport, health, movement, exercise, recreation dance, and daily living related activities.

KNES618 Current Readings in Exercise and Applied Physiology (1 Credit)
Student-led presentations of contemporary literature in the areas of genetics, exercise science, fitness and health. Emphasis on papers describing new research findings, novel techniques, innovative methods, and emerging issues.
Prerequisite: KNES360; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: KNES618, KNES609P, or KNES609N.

KNES621 Teaching Elementary Physical Education (3 Credits)
Students will learn aspects of teaching elementary physical education including: characteristics of elementary school students, testing, grading, teaching lifetime skills, and effective teaching techniques using SHAPE America Standards.
Restriction: Must be enrolled in Pre-K to 12 Physical Education Master of Education program.
Credit Only Granted for: KNES689V or KNES621.
Formerly: KNES689V.

KNES622 Teaching Secondary Physical Education (3 Credits)
Students will learn aspects of teaching secondary physical education including: characteristics of secondary school students, testing, grading, teaching lifetime activities, and effective teaching techniques using SHAPE America Standards.
Restriction: Must be enrolled in PreK-12 Physical Education Master of Education program.
Credit Only Granted for: KNES689I OR KNES622.
Formerly: KNES689I.

KNES630 Sociology of Sport in Contemporary Perspective (3 Credits)
Studies social organization and the role of individuals and groups in sport situations: the interrelationship of sport with traditional social institutions; sport as a sub-system and its structure; and sport and social problems.

KNES645 Exercise and Brain Health (3 Credits)
Examines the evidence for exercise to affect brain function and brain health in children, in adults, and in old age. Covers the adaptations to acute and chronic exercise within brain networks related to emotion, stress reactivity, memory, and executive function, and the effectiveness of physical activity and exercise as treatments for depression, anxiety disorders, and cognitive impairment.
Prerequisite: Minimum grade of C- in KNES350; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: KNES645 or KNES689X.
Formerly: KNES689X.

KNES660 Psychology of Athletic Performances (3 Credits)
Psychological factors, mechanisms, and processes in athletic performance. The basic approach is social psychological, according to which the focus is on individual performance in the interpersonal athletic context. Intrapersonal and interpersonal factors and their effects on athletic performance. Psychology of peak performance, choking, and errors of mental control. Analysis of the general principles and types of mental training.
Prerequisite: KNES350.
Credit Only Granted for: KNES660 or KNES689Z.
Formerly: KNES689Z.

KNES662 Psychology of Exercise and Health (3 Credits)
Examines the antecedents and consequences of exerciese behavior. Explores motivation, attitude, control, socialization. Proposes intervention strategies at the individual, organizational and societal levels.
Prerequisite: KNES350; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: KNES662 or KNES689O.
Formerly: KNES689O.

KNES663 History of Sport in Western Culture (3 Credits)
The history of sport in the ancient, medieval and renaissance West.

KNES670 Biomechanics Theory (3 Credits)
Theoretical basis for understanding the investigation of biomechanical aspects of the human body. Integration of subject matter from physics, engineering, anatomy, kinesiology, and physiology as it relates to the study of human motion and the body as a mechanical system.
Prerequisite: MATH121 or MATH141; or must have completed MATH221.

KNES674 Quantitative Methods in Cognitive Motor Behavior (3 Credits)
Includes basic computer programming, algorithm, and quantitative techniques for time- series data with an emphasis on, but not limited to, human movement. These topics will be taught using MATLAB, a programming language and environment for numerical computation, data processing, analysis, and visualization.
Recommended: Proficiency in Precalculus and Linear Algebra or permission of department.
Credit Only Granted for: KNES689R or KNES674.
Formerly: KNES689R.

KNES676 Multisensory Perception and Human Motor Control (3 Credits)
Overview of the major sensory inputs to human motor control and spatial orientatin including auditory, somatosensory, visual and vestibular.

KNES678 Professional Seminar for Teacher Development in Physical Education (1-3 Credits)
The spring seminar course is an extension of the fall seminar course and spring internship course. It accompanies a full time undergraduate level teaching internship and is intended to support and extend students' field experience learning. The spring seminar course is designed to continue to provide students with the support they need to successfully meet the College of Education's Middle School Mathematics and Science programmatic requirements and the Maryland State Department of Education's Middle School Mathematics and Science Teacher Certification Requirements. These requirements include demonstrating mastery on all of the College of Education's Foundational Competencies (FCCs) and Performance Based Assessments (PBAs) and the national edTPA, InTASC, and AMLE Standards.
Restriction: By permission only for graduate students enrolled in the KNES MCERT program.
Repeatable to: 3 credits.

KNES688 Seminar in Motor Learning and Performance (3 Credits)
Discussion of research dealing with advanced topics in motor learning and skilled performance. Recent developments concerning individual differences, refractoriness, anticipation and timing, transfer, retention, and work inhibition are emphasized.
Prerequisite: KNES385 and KNES496.
Repeatable to: 6 credits.

KNES689 Special Problems in Kinesiology (1-6 Credits)
Master or doctoral candidates who desire to pursue special research problems under the direction of their advisor may register for 1-6 hours of credit under this number.

KNES691 Muscular Aspects of Exercise Physiology (3 Credits)
Skeletal muscle structure and function including muscle development, excitation-contraction coupling, muscle fiber types and fatigue, muscle biochemistry, gene expression, muscle damage and regeneration. The effects of aging and exercise training on skeletal muscle.
Prerequisite: KNES360.
Recommended: BSCI422.

KNES692 Cardiovascular Aspects of Exercise Physiology (3 Credits)
A comprehensive consideration of the various cardiovascular factors affecting human physical performance. Emphasis on the regulation of cardiovascular functions during physical activity. Energy liberation and transfer, circulation, respiration, temperature regulation, physiology of work at altitudes, aerobic endurance training, and exercise, health and aging.
Prerequisite: KNES360.

KNES694 Metabolic Aspects of Exercise Physiology (3 Credits)
Effects of exercise on digestion, absorption, transport, storage, mobilization, and utilization of macronutrients. Emphasis on the effects of exercise training on energy metabolism.
Prerequisite: KNES360.
Recommended: BCHM462 and BCHM461.

KNES695 Laboratory Techniques in Exercise Physiology (3 Credits)
Lab exercise testing techniques and interpretation. Includes graded exercise testing, VO2 max, lactate threshold, phlebotomy, exercise economy, body composition, muscle biopsy, resting metabolic rate, anaerobic power and blood flow.
Prerequisite: KNES360.

KNES711 Professional Development and Grantsmanship (3 Credits)
Enhance continued professional development through an exploration of culture, climate, expectations and mentoring in research I universities. Generate a grant application including the hypothesis, structure, specific aims, background and significance, and submission of a total grant. Grant process and product will be emphasized.
Restriction: Must be a Doctoral student; and must be in a major in SPHL-School of Public Health.
Credit Only Granted for: KNES711 or KNES789X.
Formerly: KNES789X.

KNES778 Internship in Physical Activity and Public Health (1-4 Credits)
The internship is a time-limited, supervised period of public/community health activities carried out in a health or allied health organization involved with physical activity. Students gain practical experience in areas such as program planning and implementation, program evaluation, public policy analysis, research, and management.
Prerequisite: KNES600, KNES601, and KNES602.
Repeatable to: 4 credits.
Credit Only Granted for: KNES778 or KNES785.

KNES785 Internship in Physical Activity and Public Health (3 Credits)
The internship is a time-limited, supervised period of public/community health activities carried out in a health or allied health organization involved with physical activity. Students gain practical experience in areas such as program planning and implementation, program evaluation, public policy analysis, research, and management.
Prerequisite: EPIB610, EPIB650, HLSA601, HLTH665, KNES600, KNES601, and MIEH600.
Recommended: KNES602.
Credit Only Granted for: KNES778 or KNES785.

KNES786 Capstone Project in Physical Activity and Public Health (3 Credits)
The culminating experience in which the student applies knowledge and skills learned in the MPH program to conduct independent work on a physical activity problem under the supervision of a faculty advisor.
Prerequisite: KNES600, KNES601, and KNES602.

KNES789 Advanced Projects in Kinesiology (1-3 Credits)
Advanced projects examining current problems and trends in kinesiology.
Repeatable to: 3 credits.

KNES798 Internship in Physical Education/Sports Management (1-8 Credits)
Practical application of previously acquired skills and knowledge in a sport and/or physical education setting. Emphasis on selected experiences to enhance the total academic program of the student. The internship site assignment will depend upon student's background and career goals.
Prerequisite: Permission of SPHL-Kinesiology department.
Repeatable to: 8 credits.

KNES799 Master's Thesis Research (1-6 Credits)

KNES898 Pre-Candidacy Research (1-8 Credits)

KNES899 Doctoral Dissertation Research (1-8 Credits)

KORA - Korean

KORA499 Independent Study Korean (1-3 Credits)
Independent study under faculty supervision.
Prerequisite: Permission of instructor.
Repeatable to: 6 credits if content differs.

LARC - Landscape Architecture

LARC420 Professional Practice (3 Credits)
An introduction to and comparative study of the professional concerns of design firms. Focus on planning, legal, ethical, marketing and management considerations of interdisciplinary practices.
Prerequisite: LARC321.
Restriction: Must be in Landscape Architecture program.

LARC440 Urban Design Studio (5 Credits)
The landscape architect's role within the interdisciplinary urban design process, focusing on urban site design issues. Pedestrian friendly site design and the future of sustainable development will be studied.
Prerequisite: LARC321; and LARC340; and LARC341.
Restriction: Must be in Landscape Architecture program.

LARC450 Environmental Resources (3 Credits)
A review of ecosystems and an examination of planning strategies for preservation, conservation, management and development of sensitive natural and cultural landscape resources in the mid-Atlantic region.
Prerequisite: ENST200; or permission of AGNR-Plant Science & Landscape Architecture department.

LARC451 Sustainable Communities (3 Credits)
Explores concepts, strategies and examples of community design which address the needs of a growing population while preserving the environment and its resources.

LARC452 Green Infrastructure and Community Greening (3 Credits)
A critical look and exploration of green infrastructure (GI) elements in the built environment in contributing to ecosystems services and the sustainability of the built environment. The course explores the science, issues, challenges, and the policy, planning and design solutions offered by green infrastructure.
Prerequisite: PLSC110 and PLSC111; or (PLSC112 and PLSC113); or permission of instructor.
Restriction: Junior standing or higher.
Credit Only Granted for: LARC489G or LARC452.
Formerly: LARC489G.

LARC461 People and the Environment (3 Credits)
Focus is placed on human and environmental interactions. Students will look at both natural and built environments and how they influence human health and well-being. Many environmental settings will be examined. These include hospitals, public housing neighborhoods, school settings, retirement communities, transportation corridors and green spaces. We will also explore how racial and socio-economic factors affect living and working environmental conditions. Ultimately, students will be using this knowledge to create environments that support individuals, families and various community groups' health and well-being.
Credit Only Granted for: LARC489K or LARC461.
Formerly: LARC489K.

LARC470 Landscape Architecture Seminar (3 Credits)
A combination of self-directed study, seminar, and lecture formats. An introduction to aspects of research methods, critical analysis, and proposal writing with a focus on urban and community design.
Prerequisite: LARC321; and LARC341.
Corequisite: LARC440.
Restriction: Senior standing; and must be in Landscape Architecture program.

LARC471 Capstone Studio: Community Design (5 Credits)
A capstone experience that emphasizes the integration of critical thinking skills and methodologies introduced throughout the landscape architecture curriculum. Students apply design and analysis methodologies, evaluate alternative solutions, involve community residents and engage in final design development, using the master plan and site design process, report writing, and oral and graphic presentations. Final presentations are open to the university and the community.
Prerequisite: LARC440; and LARC470.
Restriction: Senior standing; and must be in Landscape Architecture program.

LARC489 Special Topics in Landscape Architecture (1-4 Credits)
Credit according to time scheduled and organization of course. A lecture and/or studio course organized as an in-depth study of a selected specialization of landscape architecture not covered by existing courses.
Prerequisite: Permission of AGNR-Plant Science & Landscape Architecture department.
Repeatable to: 4 credits if content differs.

LARC499 Independent Studies in Landscape Architecture (1-4 Credits)
Independent studies in landscape architecture including field, studio or library research under the direction of a faculty member.
Prerequisite: 12 credits in LARC courses; or permission of AGNR-Plant Science & Landscape Architecture department.
Restriction: Must be in Landscape Architecture program; or must be in Plant Sciences program.
Repeatable to: 4 credits if content differs.

LARC620 Graphic Tools for Landscape Representation (3 Credits)
This course integrates digital and analog methods of communication and provides an introduction to computer tools and techniques commonly used in landscape architecture practice. Non-drafting computer tools will be used to orient basic digital image capture, manipulation, and presentation formatting. Also includes techniques and application of various media for graphic communication associated with landscape architecture.
Corequisite: LARC640.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC621 Digital Drafting and Mapping (3 Credits)
The development and application of computing tools as used by the landscape architecture profession. Computer-Aided Design and Drafting (CADD) develops computer drafting skills using a variety of software programs. It also introduces students to Geographic Information Systems (GIS) mapping technologies, computational representations and modeling of landscape processes and solution methods for problems involving the special arrangement of land use activities.
Prerequisite: LARC620; or permission of AGNR-Plant Science & Landscape Architecture department.

LARC640 Graduate Studio I (5 Credits)
Principles and techniques of design as applied to shaping the landscape; developing concepts in visual thinking, environmental awareness, and design intervention through studio exercises and projects.
Corequisite: LARC620.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC641 Graduate Studio II (5 Credits)
Principles and techniques of site analysis, environmental design and site development for human settlements and interaction with natural systems. Will expand analytical skills through complex site design problems. Students will research, observe and apply low impact development and sustainable practices, become familiar with building and landscape types by investigating alternative arrangements on the land, and understand user needs and design for populations with a range of abilities. Will support LEED and sustainable practices and acknowledge the requirements of public health, safety, and welfare.
Prerequisite: LARC640.
Corequisite: LARC720.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC642 Graduate Studio III (5 Credits)
A focus on the interaction of landscape science (hydrology, geology, etc.) with the necessities and mechanisms of human settlements (transportation, economics, etc.) emphasizing innovative and forward thinking solutions to urbanization and ecological problems. It will apply this knowledge to landscape analysis, recreational planning and design, and community development, emphasizing resource management, spatial organization, landscape character, and the physical and social structure of community services. This course will be required for both Trach 1 and Track 2 students.
Prerequisite: LARC641.
Corequisite: LARC670.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC648 Graduate Studio IV (5 Credits)
An exploration that will focus on issues in landscape planning and design such as campus planning, urban housing and recreation, and neighborhood preservation, restoration and development. Projects will emphasize the value of responsible academic and civic landscapes, the place of historic resources in contemporary life, and innovative solutions for the integration of past and future landscapes.
Prerequisite: LARC721 and LARC642.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.
Repeatable to: 6 credits if content differs.

LARC663 Landscape and Garden History (3 Credits)
History of garden making and its evolution into design practice. Students will become familiar with narratives of garden art and landscape architecture through the study of selected key sites, designers, and visual written sources. A focus on gardens' past and afterlife; the nature of primary sources (both built and written), and how these can be evaluated and used. Primary sources will be drawn from several disciplines and include a wide array of genres: treatises, epistolary exchanges, tax returns, novels, poems, paintings and drawings.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC670 Landscape Architecture Theory and Criticism (3 Credits)
Review and analysis of the body of literature concerning landscape architecture and relationships between humans and both natural and designed environments. Topics may include: rationalism, ethics, aesthetics, social and economic values, postmodernism, feminist, multiculturalism, ecological determinism, preservation/conservation, and sustainability and ecological design. Each week students will lead a debate and discussion on a theoretical issue based on the assigned readings for that week.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC671 Landscape Architecture Research Methods (3 Credits)
Investigation and discussion of broad scope of research methods and the development of landscape design and planning research techniques and skills. The urban environment will be viewed primarily as a social and psychological environment, with concern for who uses these environments and the conflicts that can arise between user groups.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC689 Special Topics in Landscape Architecture (1-6 Credits)
Special topics in landscape architecture
Repeatable to: 6 credits if content differs.

LARC699 Independent Studies in Landscape and Architecture (1-3 Credits)
Individual Instruction course.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

LARC720 Environmental Analysis and Site Engineering (3 Credits)
Techniques for prediction of alterations in social and natural processes brought about by human use of the land; application of such assessments to environmental management; basic methods of landscape alteration, augmentation, and control including grading, drainage, road and trail design, and stormwater management.
Prerequisite: LARC640; or permission of AGNR-Plant Science & Landscape Architecture department.
Corequisite: LARC641.

LARC721 Landscape Construction Methods and Materials (3 Credits)
Basic methods of constructing landscapes and manipulating the appropriate plant and inorganic materials for the creation of ecologically sustainable environments for human use. An examination of the use, properties, and detailing of materials used in landscape construction.
Prerequisite: LARC720.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.

LARC748 Advanced Special Topics Studio (5 Credits)
Advanced special topics comprehensive landscape architecture studio-exploration will focus on cultural, behavioral and ecological issues in the physical planning and design of urban landscapes.
Prerequisite: LARC648 and LARC671.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.
Repeatable to: 10 credits if content differs.

LARC799 Master's Thesis Research (1-6 Credits)
Development of a terminal thesis on a problem in landscape architecture, designed to demonstrate comprehensive skills and knowledge achieved in the graduate program. The subject will be selected in consultation with an advisor and periodically reviewed with a committee headed by the advisor.
Prerequisite: LARC748.
Restriction: Permission of AGNR-Plant Science & Landscape Architecture department.
Repeatable to: 12 credits if content differs.

LASC - Certificate in Latin American Studies

LASC448 Special Topics in Latin American Studies (3 Credits)
Intensive study of a selected topic related to Latin American Studies.
Restriction: Junior standing or higher.
Repeatable to: 6 credits if content differs.

LASC458 Senior Capstone Course in Latin American Studies (3 Credits)
Capstone course for advanced students in the Latin American Studies Certificate Program or other students with appropriate preparation. Interdisciplinary topics will vary each semester.
Prerequisite: LASC234 and LASC235; or permission of ARHU-School of Languages, Literatures, and Cultures department.
Restriction: Must be in Latin American Studies Certificate program; and senior standing.

LASC486 Internship in Latin American/Caribbean Studies (1-6 Credits)
Internship experience with an organization that works with or studies Latin American and/or the Caribbean. This is an experiential learning course that provides semester-long training that enriches the student's academic field of study and the LASC Certificate. Students submit a final written report of their experience, including critical analysis of the institutional relevance to their major field of study and to Latin American Studies. Students will also be asked to give an oral presentation.
Prerequisite: Student must have completed at least two LASC courses, one of which must be a required/core course (LASC/SPAN234, LASC/SPAN235, LASC/HIST250, or LASC/HIST251); and permission of Latin American Studies Center required.
Restriction: Minimum cumulative GPA of 2.5; and must have earned a minimum of 60 credits.
Additional Information: The course is primarily intended for students seeking the Certificate in Latin American Studies, but exceptions will be considered for students with educational or career interests which lie in this area. Student internships must be approved by the Director, and students must secure an appropriate faculty mentor for the internship course. An internship course will be approved only if a faculty supervisor is available.

LASC499 Independent Study in Latin American Studies (1-3 Credits)
Independent Study in Latin American Studies.
Restriction: Permission of instructor.

LASC608 Perspectives on Latin America and the Caribbean (3 Credits)
Exposes students to major theoretical, disciplinary, and/or methodological approaches to Latin American and Caribbean studies as practiced in the arts and humanities, and/or the behavioral and social sciences, including history, literary studies, anthropology, and political science. Topics include racial, social, ethnic, and national identities, demographic mobility, and cultural, economic, political, and intellectual exchanges in the Americas.
Restriction: Permission of the Latin American Studies Center.
Repeatable to: 6 credits.
Credit Only Granted for: LASC608 and LASC448U.
Formerly: LASC448U.
Additional Information: This course is offered every other semester.

LASC609 Colloquium in Latin American and Caribbean Studies (1-2 Credits)
The colloquium is one of three core courses for the Graduate Certificate in Latin American and Caribbean Studies. Providing 3 credits over the course of multiple semesters (1-2 credits per semester), it ensures an ongoing intellectual community among students, faculty, and guest scholars. For group discussions, the Colloquium meets four times per semester. Additionally, students attend Latin American and Caribbean activities and events in order to discuss and theorize about the region and its diaspora from informed perspectives. Each semester's colloquium provides 1-2 credits toward the Graduate Certificate.
Restriction: Permission of the Latin American Studies Center.
Repeatable to: 6 credits.

LASC648 Special Topics in Latin American and Caribbean Studies (1-3 Credits)
Intensive study of a selected topic related to Latin America, the Caribbean, or Latina/o Studies.
Repeatable to: 9 credits if content differs.

LASC688 Experiential Learning in Latin American and Caribbean Studies (1-3 Credits)
Offers an opportunity for practical experience of Latin American and Caribbean organizations, to supplement a methodological focus. Credits may be fulfilled with internships, an applied research assistantship, or any program outside the University that focuses on the experiences of Latin America, the Caribbean, and related diasporas. Examples of experiential learning may include internships at organizations such as the Pan American Health Organization, the World Bank, the Washington Office on Latin America (WOLA), or Casa de Maryland.
Restriction: Permission of the Latin American Studies Center.
Repeatable to: 3 credits.

LASC689 Research Praxis in Latin American and Caribbean Studies (1-3 Credits)
The concentration in research praxis is intended primarily to serve students who are interested in academic research and teaching in Latin American and Caribbean studies by exposing them to a research experience supervised by an affiliate faculty member in Latin American and Caribbean studies. This might be a 3-credit intensive research seminar or independent studies tutorial involving a major research project or a 1-3 credit research assistantship in Latin American and Caribbean studies.
Restriction: Permission of the Latin American Studies Center.
Repeatable to: 3 credits.

LATN - Latin

LATN403 Roman Satire (3 Credits)
Readings are in Latin.

LATN405 Lucretius (3 Credits)
Readings are in Latin.

LATN410 Latin Historians (3 Credits)
Latin historical writing as a literary genre. Influences, style, and literary techniques. Readings are in Latin.

LATN415 Vergil's Aeneid (3 Credits)
Vergil's Aeneid: readings of selections in Latin and of the entire epic in English translation along with critical essays.
Formerly: LATN305.

LATN424 Silver Age Latin (3 Credits)
Reading and analysis of selected texts. Emphasis on the role of Nero and Seneca in literary developments. Readings are in Latin.

LATN472 Historical Development of the Latin Language (3 Credits)
An analysis of the development of the Latin language from archaic times to the Middle Ages.
Credit Only Granted for: LATN472 or LING431.

LATN488 Latin Readings (3 Credits)
The reading of one or more selected Latin authors from antiquity through the Renaissance. Reports.
Prerequisite: Permission of ARHU-Classics department.
Repeatable to: 6 credits if content differs.
Additional Information: Readings are in Latin.

LATN499 Independent Study in Latin Language and Literature (1-3 Credits)
Prerequisite: Permission of ARHU-Classics department.
Repeatable to: 6 credits if content differs.

LATN604 Cicero (3 Credits)
A study of Cicero's contributions to Roman literature and culture. Readings from the speeches, letters, and/or philosophical and rhetorical works. The development of Cicero's style, his philosophy, and his attitudes toward the changing political scene between 82 and 43 B.C.

LATN605 Vergil (3 Credits)
A study of Vergil's development as a literary artist and Augustan poet through readings in the Eclogues, Georgics, and Aeneid. Readings are in Latin.

LATN623 The Augustan Age (3 Credits)
Analysis of the major literary figures and genres in prose and poetry of the period from 43 BC to AD 14.

LATN624 Silver Age Latin (3 Credits)
An investigation of both the evolving Latin language and the major literary figures and genres in prose and poetry of the period from A.D. 14 through the mid-second century.

LATN630 Latin Literature of the Late Empire (3 Credits)
An examination of Latin literary texts from the third to the fifth centuries A.D., Christian as well as pagan.

LATN631 Medieval Latin (3 Credits)
An examination of literary documentary texts in Latin from the end of the Roman Empire to the Renaissance.

LATN672 Historical Development of the Latin Language (3 Credits)
An analysis of the development of the Latin language from the archaic period to the Middle Ages.

LATN688 Special Topics in Latin Literature (3 Credits)
Repeatable to: 9 credits if content differs.

LATN699 Independent Studies in Latin Literature (1-3 Credits)
Prerequisite: Permission of ARHU-Classics department.
Repeatable to: 6 credits.

LATN799 Master's Thesis Research (1-6 Credits)

LBSC - Library Science

LBSC499 Workshops, Clinics, and Institutes (1-9 Credits)
Workshops, clinics, and institutes developed around specific topics or problems. Primarily for practicing librarians.
Repeatable to: 9 credits.

LBSC602 Serving Information Needs (3 Credits)
An introduction to the skills necessary to interact directly with individuals through the exploration of user behavior theory, strategies to locate and evaluate information from print and electronic resources, and policies and procedures to ensure that all individuals can become information literate.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC602, or both LBSC601 and LBSC650.

LBSC611 History of the Book (3 Credits)
Introduction to the history and development of the book from pre-printing and incunabula to the post-modern book. Book illustration; publishing; collecting.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC611 or LBSC078B.
Formerly: LBSC708B.

LBSC631 Achieving Organizational Excellence (3 Credits)
Overview of the principles, practices, and techniques required for effective leadership and management. The innovative strategies, management responsibilities, and skills needed to achieve and sustain high organizational performance in information-based cultural institutions.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC631 or LBSC635.

LBSC641 Selecting and Evaluating of Resources for Learning (3 Credits)
Policies and procedures for collection development, including identifying, evaluating, acquiring, providing, and promoting resources in all formats, to support learning and teaching in elementary and secondary schools.
Restriction: Permission of INFO-College of Information Studies.

LBSC644 Collection Development (3 Credits)
Activities through which library collections are systematically developed and managed are explored, especially the formulation and implementation of written collection development policies. Other specific topics include identification of user needs; collection evaluation; fund allocation among competing departments, subjects, and/or media; selection methods; intellectual freedom; storage alternatives; and cooperative collection development.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC 644 or LBSC 708G.
Formerly: LBSC 708G.

LBSC645 Literature and Materials for Children (3 Credits)
Survey of literature and other materials for children and youth. Criteria for evaluating and using such materials as they relate to the needs, interests, reading abilities, and other capabilities of young readers.
Restriction: Permission of INFO-College of Information Studies.

LBSC646 Literature and Materials for Young Adults (3 Credits)
Survey of literature and other materials for older children and adolescents. Criteria for evaluating and using such materials as they relate to the needs, interests, reading abilities, and other capabilities of young readers.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC646 or LBSC746.
Formerly: LBSC746.

LBSC647 Children's Services in the Public Library (3 Credits)
Public library services for children, birth to 12 years of age. Developmental characteristics and information needs of children. Children as a client group. Programming and collection development. Management of children's services, including planning, staffing, and advocacy.
Restriction: Permission of INFO-College of Information Studies.

LBSC671 The Lifecycle of Information (3 Credits)
Introduction to methods used to create, acquire, organize, manage and preserve information. Information systems currently used to support digital and physical libraries, databases, and repositories will be explored.
Restriction: Permission of INFO-College of Information Studies.
Credit Only Granted for: LBSC671, or LBSC670 and LBSC690.

LBSC702 User Instruction (3 Credits)
Critical analysis of the rationale, content, and processes of user instruction in library and information settings.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC703 Field Study in Archives and Digital Curation (3 Credits)
Supervised internship experience in archives or digital curation programs in organizations and institutions.
Prerequisite: LBSC602, LBSC631, and LBSC671; and must have completed 9 additional credits. Or permission of instructor.
Restriction: Must be in Library and Information Science (Master's) program; and permission of INFO-College of Information Studies.

LBSC706 Seminar in International and Comparative Librarianship and Information Science (3 Credits)
Comparison and contrast of bibliographic systems, institutions, service arrangements, and professional patterns in developed and developing cultures. Libraries, information organizations, and international information systems viewed against the backdrop of national cultures. Influences of social, political, and economic factors upon these forms.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC707 Field Study in Information Service (3 Credits)
Supervised internship experience in a library, archive, museum, or other information organization.
Prerequisite: LBSC602, LBSC671, and LBSC631; and must have completed an additional 9 credits. Or permission of instructor.
Restriction: Must be in Library and Information Science (Master's) program; and permission of INFO-College of Information Studies.

LBSC708 Special Topics in Library and Information Science (1-3 Credits)
A special topics course with content determined by individual instructors. For questions about the content of the course contact the College of Information Studies.
Restriction: Permission of INFO-College of Information Studies.
Repeatable to: 9 credits if content differs.
Additional Information: No student may earn more than a total of 12 credits (combined) in LBSC 708 and LBSC 709.

LBSC709 Independent Study (1-3 Credits)
Intensive individual study, reading, or research in an area of specialized interest under faculty supervision.
Restriction: Permission of instructor; and permission of INFO-College of Information Studies.
Repeatable to: 9 credits.

LBSC713 Planning and Evaluating Library and Information Services (3 Credits)
An investigation of quantitative and qualitative methods used to plan and evaluate the effectiveness of library and information services. Planning and evaluation methodologies will be analyzed and critiqued. Selected methods will be demonstrated and/or utilized.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC723 Advocacy and Support for Information Services (3 Credits)
Role and influence of government, foundations, associations, and other organizations in supporting and setting the agenda for information services of all types. Role of information professionals in demonstrating advocacy, fund-raising, public relations, lobbying, and seeking external support.
Restriction: Permission of INFO-College of Information Studies.

LBSC724 Public Library Seminar (3 Credits)
Organization, support, and service patterns of public libraries. The public library in national, state, and local contexts.
Prerequisite: Permission of INFO-College of Information Studies.

LBSC731 Special Collections (3 Credits)
Management of special collections, whose holdings may include manuscripts (particularly personal papers), non-textual materials, graphical materials, and rare books, with analysis of the custodial and management functions associated with special collections.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC734 Seminar in the Academic Library (3 Credits)
Role of the academic library within the framework of higher education. Planning programs and services, collections, support, fiscal management, physical plant, and cooperation.
Prerequisite: LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC741 Seminar in School Library Administration (3 Credits)
Development, management, and evaluation of school library programs at all levels.
Prerequisite: INST650; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC742 Collaborative Instructional Design and Evaluation (3 Credits)
School librarians' collaborative role in instruction. Systematic design, development, and evaluation of instructional strategies and products for learning.
Prerequisite: INST650; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC745 Storytelling Materials and Techniques (3 Credits)
Literary sources and instruction and practice in oral techniques.
Prerequisite: LBSC645; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC748 Advanced Seminar in Children's Literature (3 Credits)
Selected topics in literature for children and adolescents, including historical aspects, individual authors, and major themes and trends.
Prerequisite: LBSC645; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC749 Internship in School Libraries (1-6 Credits)
Opportunities to observe and participate in the operation of school libraries at the elementary and secondary levels under the supervision of certified school librarians. Required of all School Library Media certification candidates.
Prerequisite: INST650, LBSC641, INST651, and LBSC741; or permission of instructor.
Restriction: Permission of instructor; and permission of INFO-College of Information Studies.
Repeatable to: 6 credits.
Credit Only Granted for: LBSC744 or LBSC749.
Formerly: LBSC744.

LBSC750 Research and Teaching Fellowship I (1 Credit)
Part of the Research and Teaching Fellowship program, a three-semester teacher training and professional development program in academic libraries. Fellows will complete weekly readings, participate in weekly discussions, observe information literacy instruction sessions, and co-teach at least one research session with another fellow.
Restriction: Permission of INFO-College of Information Studies.

LBSC751 Research and Teaching Fellowship II (1 Credit)
Part of the Research and Teaching Fellowship program, a three-semester teacher training and professional development program in academic libraries. Fellows will complete weekly readings, complete weekly teaching reflections, and begin preparations for the academic job search.
Restriction: Permission of INFO-College of Information Studies.

LBSC752 Research and Teaching Fellowship III (1 Credit)
Part of the Research and Teaching Fellowship program, a three-semester teacher training and professional development program in academic libraries. Fellows will complete weekly readings, participate in weekly discussions, and serve as a Discussion Leader for two class periods of LBS750, Research and Teaching Fellowship I. Taken in conjunction with the field study course, either LBSC 703 or LBSC 707.
Restriction: Permission of INFO-College of Information Studies.

LBSC753 Information Access in the Social Sciences (3 Credits)
Research methods, information needs, information structure, and information sources and services in the social sciences (for example, anthropology, economics, education, geography, history, political science, psychology, sociology).
Prerequisite: LBSC650 or LBSC602; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC770 Metadata and Tools for Information Professionals (3 Credits)
Principles, standards, and practices of information representation to facilitate accessing needed information in digital bibliographic environments. Includes exposure to Metadata, XML, RDA/AACR2R, DTDs, MARC, Dublin Core, MODS, ISBN and ISSN, FRBR, FRAD, Classification systems, and Controlled Vocabularies such as LCSH, SEARS, NLM, Getty and ERIC Thesauri, and others.
Prerequisite: LBSC671; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC773 Classification Theory (3 Credits)
Survey of classificatory principles from bibliographic, philosophical, biological, psychological, and linguistic perspectives. Challenges to traditional principles from the cognitive sciences and their implementations for bibliographic classification.
Prerequisite: LBSC671; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC774 Seminar in Linguistic Topics (3 Credits)
Topics in linguistics with applications in information science. Syntax and semantics as they apply to the analysis of communication processes and to natural language processing for information storage and retrieval.
Prerequisite: LBSC671; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC775 Indexing, Abstracting and Thesaurus Construction (3 Credits)
Fundamentals of indexing, abstracting, and thesaurus construction in theory and practice, including: the formation of vocabularies; construction of a thesaurus; systems of indexing; effects of systems upon information retrieval; style and format of abstracts; evaluation of abstracting services; and requirements of users of abstracts. The design and construction of index languages/thesauri and analysis and evaluation of existing index languages/thesauri. Discussion of currently available indexing software packages.
Prerequisite: LBSC671; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC786 Library and Archives Preservation (3 Credits)
An introduction to library and archives materials and media, the risks that affect their preservation and strategies used to enhance preservation of library and archives collections. The course reviews preservation knowledge and skills that archival and library staff uses when providing access, managing, processing and working with collections.
Prerequisite: INST604; and permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC789 Special Topics in Contemporary Archives (3 Credits)
Issues in administering contemporary archives and records management programs. Topics are selected by individual instructors. For course content information please contact the College of Information Studies.
Prerequisite: INST604; or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC791 Designing Principled Inquiry (3 Credits)
Critical analysis of roles of information professions and institutions in integrating theory, methods, practice, policies, and values of the field, and applying them to the design of future information systems and services.
Prerequisite: LBSC671, LBSC602, and LBSC631; and additional 9 credits of coursework applied to the MLIS degree. Or permission of instructor.
Restriction: Permission of INFO-College of Information Studies.

LBSC799 Master's Thesis Research (1-6 Credits)
Intensive research conducted under the supervision of a faculty member.
Prerequisite: INST701; and permission of instructor.
Restriction: Must be in Library and Information Science (Master's) program; and permission of instructor; and permission of INFO-College of Information Studies.
Repeatable to: 9 credits.

LGBT - Lesbian Gay Bisexual Transgender Studies

LGBT448 Special Topics in Lesbian, Gay, Bisexual, and Transgender Studies (3 Credits)
In-depth study of particular themes and issues in LGBT studies.
Prerequisite: LGBT200; or permission of LGBT Studies Program.
Restriction: Junior standing or higher.
Repeatable to: 9 credits if content differs.

LGBT448W Sex, Gender, and Jewish Identity (3 Credits)
An exploration of Jewish embodiment, including dynamics related to biological sex, culturally-framed gender, and sexuality. Topics of discussion may include transgender and intersex Jews, stereotypes and gender performance, modesty, genetics, and body alteration. Focus is on contemporary Jewish culture, framed within the larger historical and textual tradition.
Prerequisite: 1 course in WMST; or 1 course in JWST; or 1 course in LGBT; or permission of instructor. Cross-listed with: JWST492, WMST498W.
Credit Only Granted for: JWST492, JWST409G, JWST419W, LGBT448W, or WMST498W.
Formerly: JWST409G and JWST419W.

LGBT459 Selected Topics in Sexuality and Literature (3 Credits)
Detailed study of sexuality as an aspect of literary and cultural expression.
Prerequisite: Must have completed two lower-level English courses, at least one in literature.
Repeatable to: 9 credits if content differs.

LGBT488 Seminar in Lesbian, Gay, Bisexual, and Transgender Studies (1-3 Credits)
Developments in theories and methods of LGBT Studies, with emphasis upon interaction between the humanities and the social sciences in the elaboration of this interdisciplinary area of scholarship.
Prerequisite: 9 credits in LGBT courses; and permission of LGBT Studies Program.
Recommended: LGBT200. And ENGL265; or CMLT291.
Repeatable to: 9 credits if content differs.
Formerly: CMLT498Y.

LGBT494 Lesbian Communities and Differences (3 Credits)
The meanings of lesbian communities across many lines of difference. Using lesbian-feminists of the 1970s as a starting point, we will look both back and forward in history, tracing changes and exploring the meanings of these in their social and historical contexts.
Prerequisite: 1 course in LGBT, WMST, or WGSS. Cross-listed with: WGSS494.
Credit Only Granted for: LGBT494, WMST494 or WGSS494.
Formerly: WMST494.

LGBT499 Independent Study (1-3 Credits)
Directed research and analysis in LGBT Studies on a topic selected by the student.
Prerequisite: LGBT200; and permission of LGBT Studies Program.
Restriction: Senior standing.
Repeatable to: 6 credits if content differs.

LING - Linguistics

LING410 Grammar and Meaning (3 Credits)
The basic notions of semantic theory: reference, quantification, scope relations, compositionality, thematic relations, tense and time, etc. The role these notions play in grammars of natural languages. Properties of logical form and relationship with syntax.
Prerequisite: Permission of instructor; or LING311.

LING411 Comparative Syntax (3 Credits)
Comparison of data from a variety of languages with respect to syntactic theory in order to investigate how parameters of universal grammar are fixed differently in different languages. Attempts to work out fragments of grammars for some languages.
Prerequisite: LING312; or permission of instructor.

LING419 Topics in Syntax (3 Credits)
Topics vary.
Prerequisite: LING311.
Repeatable to: 12 credits if content differs.

LING420 Word Formation (3 Credits)
Examination of shape and meaning of possible words, both across languages and within particular languages. Interaction between principles of word formation and other components of a grammar: syntax, logical form and phonology.
Prerequisite: LING321 and LING311.

LING429 Topics in Phonology (3 Credits)
Advanced seminar in phonology. Topics vary.
Prerequisite: LING322.
Repeatable to: 6 credits if content differs.

LING439 Topics in Diachronic Linguistics (3 Credits)
Repeatable to: 6 credits if content differs.

LING440 Grammars and Cognition (3 Credits)
Relationship between the structure, development and functioning of grammars and the structure, development and functioning of other mental systems. Interpretations of experimental and observational work on children's language, aphasia, speech production and comprehension.
Prerequisite: LING321 and LING311.

LING444 Child Language Acquisition (3 Credits)
Examines language acquisition in infancy and early childhood: the nature of children's linguistic representations and how these develop naturally. Role of (possible) innate linguistic structure and interaction of such structure with experience. Evaluation of methods and results of current and classic research leading to contemporary models of language development.
Prerequisite: LING311.

LING448 Advanced Laboratory Research in Linguistics (2-3 Credits)
Individualized, collaborative research course aimed at developing skills for laboratory research in language acquisition, sentence processing or neurolinguistics. Conducting a research project in laboratory linguistics as part of a team creating original research relevant to current issues in linguistics.
Prerequisite: LING248; and (LING200 or LING240).
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.
Additional Information: This course is part of a two-semester sequence. Ling248 is a prerequisite. Ling248 and Ling448 must be completed in the same laboratory.

LING449 Topics in Psycholinguistics (3 Credits)
Critical evaluation of primary research in psycholinguistics. Relating theoretical hypotheses to experimental hypotheses and predictions. Evaluation of experimental results. Emphasis on hands-on experience and experimental methodologies. Specific topics vary.
Prerequisite: LING321 and LING311; or permission of ARHU-Linguistics department.
Repeatable to: 6 credits if content differs.

LING451 Grammars and Variation (3 Credits)
Grammars and the use of language in a variety of styles: formal, casual, literary, etc. Consequences for concepts of grammars. Variation theory. Literary styles.
Prerequisite: LING311.

LING453 Mathematical Approaches to Language (3 Credits)
The aspects of mathematics used in linguistic discussions: recursion theory, Chomsky's hierarchy of grammars, set theory, Boolean algebra, finite state grammars, context-free grammars, etc. Applications to theories of grammars. Formalizations of grammatical theories.
Prerequisite: LING312.

LING460 Diversity and Unity in Human Languages (3 Credits)
Fundamentals of grammatical typology as they relate to issues in social attitudes towards language. Linguistic structure of standard and non-standard languages and dialects. Relationship of different writing systems to linguistic structure. Issues in bilingualism and multilingualism.
Prerequisite: LING240 or LING200.

LING499 Directed Studies in Linguistics (1-3 Credits)
Independent study or research on language under the supervision of a faculty member.
Prerequisite: Permission of ARHU-Linguistics department.
Repeatable to: 6 credits if content differs.

LING610 Syntactic Theory (3 Credits)
Intensive introduction to transformational syntax.
Prerequisite: LING312.

LING611 Issues in Syntax (3 Credits)
Topics of current theoretical interest examined through data from a variety of languages.
Prerequisite: LING610.

LING620 Phonological Theory (3 Credits)
Topics in current phonological theory, as they relate to data from various languages. Segmental and prosodic analysis. Autosegmental theory, metrical theory, etc.
Prerequisite: LING322.

LING621 Issues in Phonology (3 Credits)
Topics of current interest in phonological theory examined through data from several languages.
Prerequisite: LING620.

LING625 Morphology and the Lexicon (3 Credits)
The structure of words and investigation of how word formation processes interact with other components of grammar.

LING640 Psycholinguistics (3 Credits)
Core graduate course in psycholinguistics, covering leading theoretical approaches and experimental methods in language acquisition, language processing, and neurolinguistics.
Restriction: Permission of instructor.

LING641 Issues in Psycholinguistics (3 Credits)
Topics of current interest in psycholinguistics, including both theoretical approaches and experimental and analytical issues in language acquisition, language processing, and neurolinguistics.
Prerequisite: LING640.

LING644 Language Acquisition (3 Credits)
Interpretations of observational and experimental work on children's language development, and relationship between developmental stages and theories of human language faculties.
Prerequisite: LING640.

LING646 Cognitive Neuroscience of Language (3 Credits)
Overview of classical and recent work on the neural basis of speech and language, with a goal of introducing contemporary methods and results to prepare the student to read the neurolinguistics and cognitive neuroscience literature. An emphasis will be placed on current techniques.

LING658 History of a Language (3 Credits)
Detailed examination of the history of a single language or language family.
Repeatable to: 6 credits if content differs.

LING659 Structure of a Language (3 Credits)
Detailed examination of a particular language or language family.
Repeatable to: 6 credits if content differs.

LING660 Introduction to Semantics (3 Credits)
Basic concepts and methods of contemporary semantic theory including basic set theory, elementary propositional and predicate calculus, the structure of predicates and propositions, quantification binding. Prepares students for study of more advanced topics in semantics.
Restriction: Permission of instructor.

LING661 Issues in Semantics (3 Credits)
A second course in semantic theory. Application of basic concepts and methods to topics of current theoretical interest.
Prerequisite: LING660; or permission of ARHU-Linguistics department.

LING663 Pragmatics (3 Credits)
An intensive introduction to formal linguistic pragmatics: the study of systematic dependencies of meaning on context of use. Topics will include implicature, presupposition, reference, topic, focus, and the linguistic means of expressing these.
Prerequisite: LING660 or PHIL660; or permission of instructor.
Recommended: LING661.

LING678 Linguistic Field Methods (3 Credits)
A hands-on introduction to conducting linguistic analysis on an unfamiliar language. Students work with a native speaker of a language that they are not familiar with, devising elicitations and developing analyses. Investigations will include phonological, morphological, syntactic, and semantic properties of the language.
Prerequisite: Minimum grade of B- in LING311 and LING321.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

LING689 Independent Study (1-3 Credits)
Independent studies in grammatical theory.
Restriction: Permission of instructor; and must be in a major within ARHU-Linguistics department.
Repeatable to: 6 credits if content differs.

LING698 Directed Study (1-3 Credits)
Repeatable to: 6 credits if content differs.

LING723 Natural Language Processing (3 Credits)
Introduce fundamental concepts, techniques, and algorithms for the computational handling of natural language. Statistical and machine learning techniques, models, and algorithms that enable computers to deal with the ambiguity and implicit structure of human language. Approaches that focus on uncovering linguistic structure, such as syntactic or semantic parsing, as well as those that focus on manipulating text in useful ways, such as question answering or machine translation.
Prerequisite: Minimum grade of C- in CMSC422; and permission of CMNS-Computer Science department. Cross-listed with: CMSC723, INST735.
Credit Only Granted for: CMSC723, LING723, or INST735.
Additional Information: CMSC students may only receive PhD Comp. credit for CMSC723 or CMSC823, not both.

LING773 Computational Linguistics II (3 Credits)
Natural language processing with a focus on corpus-based statistical techniques. Topics include: stochastic language modeling, smoothing, noisy channel models, probabilistic grammars and parsing; lexical acquisition, similarity-based methods, word sense disambiguation, statistical methods in NLP applications; system evaluation.
Prerequisite: LING723, CMSC723, or INST735; or permission of instructor. Cross-listed with CMSC773, INST736.
Credit Only Granted for: CMSC773, LING773, or INST736.
Additional Information: CMSC students may only receive PhD Comp. credit for CMSC723 or CMSC823, not both.

LING798 Research Papers in Linguistics (1-6 Credits)
Prerequisite: LING611 and LING621.
Repeatable to: 6 credits if content differs.

LING799 Master's Thesis Research (1-6 Credits)

LING819 Seminar in Syntactic Theory (3 Credits)
Current topics in research on syntactic theory.
Prerequisite: LING611.
Repeatable to: 6 credits if content differs.

LING829 Seminar in Phonological Theory (3 Credits)
Current topics in research on phonology and morphology.
Prerequisite: LING621.
Repeatable to: 6 credits if content differs.

LING839 Seminar in Language Change (3 Credits)
Topics in research on historical change in language.
Prerequisite: LING630.
Repeatable to: 6 credits if content differs.

LING848 Seminar in Computational Linguistics (3 Credits)
Current topics in research in computational linguistics.
Prerequisite: LING645; or permission of instructor.

LING849 Seminar in Psycholinguistics (3 Credits)
Current topics in research on psycholinguistics.
Prerequisite: LING640 or LING641; or permission of instructor.
Repeatable to: 6 credits if content differs.

LING859 Seminar in Language Acquisition (3 Credits)
Current topics in research on language acquisition.
Prerequisite: LING640 or LING641; or permission of ARHU-Linguistics department.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: LING859 or LING889A.
Formerly: LING889A.

LING869 Seminar in Neurolinguistics (3 Credits)
Current topics in research on neurolinguistics.
Prerequisite: LING640 or LING641; or permission of ARHU-Linguistics department.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: LING869 or LING889A.
Formerly: LING889A.

LING879 Seminar in Semantics (3 Credits)
Current topics in research in semantics.
Prerequisite: LING660 or LING661.
Repeatable to: 9 credits if content differs.
Formerly: LING889.

LING888 Doctoral Research Paper (1-6 Credits)
Students will strengthen their abilities to formulate coherent research questions, conduct research and create a publishable piece of work. In addition, the course is part of a set of requirements to advance to doctoral candidacy.
Repeatable to: 6 credits.
Credit Only Granted for: LING888 or LING895.
Formerly: LING895.

LING889 Directed Research (1-8 Credits)

LING896 Research Paper in Minor Area (3 Credits)
This course is designed to strengthen the students' ability to do research in a minor area of expertise, and to help them create a publishable piece. In addition, the course constitutes part of a set of requirements to advance to doctoral candidacy.
Prerequisite: LING888.

LING898 Pre-Candidacy Research (1-8 Credits)

LING899 Doctoral Dissertation Research (1-8 Credits)

MAIT - Masters in the Mathematics of Advanced Industrial Tech

MAIT623 Modern Mathematical Methods of Signal and Image Processing I (3 Credits)
Introduction to current signal/image processing techniques, including wavelets and frames, in the context of applied and numerical harmonic analysis. Topics include time-frequency and time-scale representations, sub-band filterbanks, and applications to compression and denoising.
Prerequisite: Must have knowledge of advanced calculus and applications.

MAIT626 Statistical Pattern Recognition and Classification (3 Credits)
Mathematical and statistical tools for decision making based on categorization of patterns present in data. Topics include regression, feature extraction, dimensionality reduction, parametric and non-parametric approaches to decision, estimation, and classification problems.

MAIT679 Special Topics in Mathematics of Advanced Industrial Technology (3 Credits)
Special topics courses are intended to expose students to the latest developments in mathematical applications. As such, the content will vary depending on the instructor and the current state-of-the-art. 679 will appear with a letter appended to distinguish different topics. New 679 courses will be added as areas of interest arise.

MAIT699 Independent Masters Project (1-3 Credits)
This course allows students to apply advanced mathematical methods to practical, real-world problems. Projects are supervised individually by faculty members from the MAIT Program. The project's nature is flexible and determined jointly by the student and supervisor. A detailed final report must be prepared by the student and approved by the supervisor.
Restriction: Permission of instructor.
Repeatable to: 12 credits if content differs.

MATH - Mathematics

MATH401 Applications of Linear Algebra (3 Credits)
Various applications of linear algebra: theory of finite games, linear programming, matrix methods as applied to finite Markov chains, random walk, incidence matrices, graphs and directed graphs, networks and transportation problems.
Prerequisite: 1 course with a minimum grade of C- from (MATH461, MATH240, MATH341).

MATH402 Algebraic Structures (3 Credits)
For students having only limited experience with rigorous mathematical proofs. Parallels MATH403. Students planning graduate work in mathematics should take MATH403. Groups, rings, integral domains and fields, detailed study of several groups; properties of integers and polynomials. Emphasis is on the origin of the mathematical ideas studied and the logical structure of the subject.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461).
Restriction: Must not be in any of the following programs (Mathematics (Master's); Mathematics (Doctoral)).
Credit Only Granted for: MATH402 or MATH403.

MATH403 Introduction to Abstract Algebra (3 Credits)
Integers; groups, rings, integral domains, fields.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH340); and 1 course with a minimum grade of C- from (MATH341, MATH241); and minimum grade of C- in MATH310. Or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: MATH402 or MATH403.

MATH404 Field Theory (3 Credits)
Algebraic and transcendental elements, Galois theory, constructions with straight-edge and compass, solutions of equations of low degrees, insolubility of the quintic equation, Sylow theorems, fundamental theorem of finite Abelian groups.
Prerequisite: Minimum grade of C- in MATH403.

MATH405 Linear Algebra (3 Credits)
An abstract treatment of finite dimensional vector spaces. Linear transformations and their invariants.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and minimum grade of C- in MATH310.

MATH406 Introduction to Number Theory (3 Credits)
Integers, divisibility, prime numbers, unique factorization, congruences, quadratic reciprocity, Diophantine equations and arithmetic functions.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH241, MATH246, MATH340, MATH341, MATH461); or permission of CMNS-Mathematics department.

MATH410 Advanced Calculus I (3 Credits)
First semester of a year course. Subjects covered during the year are: sequences and series of numbers, continuity and differentiability of real valued functions of one variable, the Riemann integral, sequences of functions and power series. Functions of several variables including partial derivatives, multiple integrals, line and surface integrals. The implicit function theorem.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241); and minimum grade of C- in MATH310. Or students who have taken courses with comparable content may contact the department.

MATH411 Advanced Calculus II (3 Credits)
Continuation of MATH410.
Prerequisite: Minimum grade of C- in MATH410; and permission of CMNS-Mathematics department.
Credit Only Granted for: MATH411 or MATH412.

MATH416 Applied Harmonic Analysis: An Introduction to Signal Processing (3 Credits)
Introduces students to the mathematical concepts arising in signal analysis from the applied harmonic analysis point of view. Topics include applied linear algebra, Fourier series, discrete Fourier transform, Fourier transform, Shannon Sampling Theorem, wavelet bases, multiresolution analysis, and discrete wavelet transform.
Prerequisite: Minimum grade of C- in MATH141; and 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and familiarity with MATLAB is required.

MATH420 Mathematical Modeling (3 Credits)
The course will develop skills in data-driven mathematical modeling through individual and group projects. Emphasis will be placed on both analytical and computational methods, and on effective oral and written presentation of results.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH241, MATH340); and 1 course with a minimum grade of C- from (MATH246, MATH341); and minimum grade of C- in STAT400. And 1 course with a minimum grade of C- from (CMSC106, CMSC131); or students who have taken courses with comparable content may contact the department. Cross-listed with AMSC420.
Credit Only Granted for: AMSC420 or MATH420.

MATH424 Introduction to the Mathematics of Finance (3 Credits)
Introduction to the mathematical models used in finance and economics with emphasis on pricing derivative instruments. Designed for students in mathematics, computer science, engineering, finance and physics. Financial markets and instruments; elements from basic probability theory; interest rates and present value analysis; normal distribution of stock returns; option pricing; arbitrage pricing theory; the multiperiod binomial model; the Black-Scholes option pricing formula; proof of the Black-Scholes option pricing formula and applications; trading and hedging of options; Delta hedging; utility functions and portfolio theory; elementary stochastic calculus; Ito's Lemma; the Black-Scholes equation and its conversion to the heat equation.
Prerequisite: Minimum grade of C- in MATH141; and 1 course with a minimum grade of C- from (STAT400, STAT410); and permission of CMNS-Mathematics department.
Recommended: MATH246, MATH240, MATH241, MATH340, or MATH341.
Credit Only Granted for: BMGT444, MATH424.

MATH430 Euclidean and Non-Euclidean Geometries (3 Credits)
Hilbert's axioms for Euclidean geometry. Neutral geometry: the consistency of the hyperbolic parallel postulate and the inconsistency of the elliptic parallel postulate with neutral geometry. Models of hyperbolic geometry. Existence and properties of isometries.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461).

MATH431 Geometry for Computer Applications (3 Credits)
Topics from projective geometry and transformation geometry, emphasizing the two-dimensional representation of three-dimensional objects and objects moving about in the plane and space. The emphasis will be on formulas and algorithms of immediate use in computer graphics.
Prerequisite: 1 course with a minimum grade of C- from (MATH461, MATH240, MATH341).

MATH432 Introduction to Topology (3 Credits)
Metric spaces, topological spaces, connectedness, compactness (including Heine-Borel and Bolzano-Weierstrass theorems), Cantor sets, continuous maps and homeomorphisms, fundamental group (homotopy, covering spaces, the fundamental theorem of algebra, Brouwer fixed point theorem), surfaces (e.g., Euler characteristic, the index of a vector field, hairy sphere theorem), elements of combinatorial topology (graphs and trees, planarity, coloring problems).
Prerequisite: Minimum grade of C- in MATH410.

MATH436 Differential Geometry of Curves and Surfaces I (3 Credits)
Curves in the plane and Euclidean space, moving frames, surfaces in Euclidean space, orientability of surfaces; Gaussian and mean curvatures; surfaces of revolution, ruled surfaces, minimal surfaces, special curves on surfaces, "Theorema Egregium"; the intrinsic geometry of surfaces.
Prerequisite: 1 course with a minimum grade of C- from (MATH241, MATH340); and 1 course with a minimum grade of C- from (MATH461, MATH240, MATH341); and must have completed two 400-level MATH courses with a minimum grade of C- (not including MATH461, 478, and 480's).

MATH437 Differential Forms (3 Credits)
Introduction to differential forms and their applications, and unites the fundamental theorems of multivariable calculus in a general Stokes Theorem that is valid in great generality. It develops this theory and technique to perform calculations in analysis and geometry. Topics include an introduction to topological spaces, the Gauss-Bonnet Theorem, Gauss's formula for the linking number, and the Cauchy Integral Theorem. Applications include Maxwell's equations of electromagnetism, connections and gauge theory, and symplectic geometry and Hamiltonian dynamics.
Prerequisite: 1 course with a minimum grade of C- from (MATH241, MATH340); and 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461).
Recommended: MATH405, MATH403, MATH436, MATH410, or MATH432.

MATH445 Elementary Mathematical Logic (3 Credits)
Elementary development of propositional and predicate logic, including semantics and deductive systems and with a discussion of completeness, incompleteness and the decision problem.
Prerequisite: Minimum grade of C- in MATH141.

MATH446 Axiomatic Set Theory (3 Credits)
Development of a system of axiomatic set theory, choice principles, induction principles, ordinal arithmetic including discussion of cancellation laws, divisibility, canonical expansions, cardinal arithmetic including connections with the axiom of choice, Hartog's theorem, Konig's theorem, properties of regular, singular and inaccessible cardinals.
Prerequisite: 1 course with a minimum grade of C- from (MATH403, MATH410).

MATH452 Introduction to Dynamics and Chaos (3 Credits)
An introduction to mathematical dynamics and chaos. Orbits, bifurcations, Cantor sets and horseshoes, symbolic dynamics, fractal dimension, notions of stability, flows and chaos. Includes motivation and historical perspectives, as well as examples of fundamental maps studied in dynamics and applications of dynamics.
Prerequisite: MATH341. Or MATH246; and (MATH240 or MATH461). Also offered as: AMSC452.
Credit Only Granted for: AMSC452 or MATH452.

MATH456 Cryptography (3 Credits)
The theory, application, and implementation of mathematical techniques used to secure modern communications. Topics include symmetric and public-key encryption, message integrity, hash functions, block-cipher design and analysis, number theory, and digital signatures.
Prerequisite: (CMSC106, CMSC131, or ENEE150; or equivalent programming experience); and (2 courses from (CMSC330, CMSC351, ENEE324, or ENEE380); or any one of these courses and a 400-level MATH course, or two 400-level MATH courses). Or permission of instructor. Also offered as: CMSC456, ENEE456.
Credit Only Granted for: MATH456, CMSC456 or ENEE456.

MATH461 Linear Algebra for Scientists and Engineers (3 Credits)
Basic concepts of linear algebra. This course is similar to MATH 240, but with more extensive coverage of the topics needed in applied linear algebra: change of basis, complex eigenvalues, diagonalization, the Jordan canonical form.
Prerequisite: Minimum grade of C- in MATH141; and must have completed any MATH or STAT course with a prerequisite of MATH141.
Credit Only Granted for: MATH240, MATH341, or MATH461.
Additional Information: This course may not be used towards the upper level math requirements for MATH/STAT majors.

MATH462 Partial Differential Equations (3 Credits)
Linear spaces and operators, orthogonality, Sturm-Liouville problems and eigenfunction expansions for ordinary differential equations. Introduction to partial differential equations, including the heat equation, wave equation and Laplace's equation. Boundary value problems, initial value problems and initial-boundary value problems.
Prerequisite: 1 course with a minimum grade of C- from (MATH241, MATH340); and 1 course with a minimum grade of C- from (MATH246, MATH341).

MATH463 Complex Variables (3 Credits)
The algebra of complex numbers, analytic functions, mapping properties of the elementary functions. Cauchy integral formula. Theory of residues and application to evaluation of integrals. Conformal mapping.
Prerequisite: 1 course with a minimum grade of C- from (MATH241, MATH340).

MATH464 Transform Methods (3 Credits)
Fourier transform, Fourier series, discrete fast Fourier transform (DFT and FFT). Laplace transform. Poisson summations, and sampling. Optional Topics: Distributions and operational calculus, PDEs, Wavelet transform, Radon transform and applications such as Imaging, Speech Processing, PDEs of Mathematical Physics, Communications, Inverse Problems.
Prerequisite: 1 course with a minimum grade of C- from (MATH246, MATH341).

MATH470 Mathematics for Secondary Education (3 Credits)
An advanced perspective on some of the core mathematics underlying high school mathematics courses. Topics include number systems, functions of one variable, equations, inequalities, trigonometric functions, curve fitting, and polynomials. The course includes an analysis of alternate approaches to mathematical ideas and problems, and makes connections between ideas that may have been studied separately in different high school and college courses.
Prerequisite: MATH141 and MATH140; and must have completed one 400-level MATH course (not to include MATH461, 478, and 480's).

MATH475 Combinatorics and Graph Theory (3 Credits)
General enumeration methods, difference equations, generating functions. Elements of graph theory, matrix representations of graphs, applications of graph theory to transport networks, matching theory and graphical algorithms.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH341, MATH461); and 1 course with a minimum grade of C- from (MATH241, MATH340); and permission of CMNS-Mathematics department. Cross-listed with CMSC475.
Credit Only Granted for: MATH475 or CMSC475.

MATH478 Selected Topics For Teachers of Mathematics (1-3 Credits)
Prerequisite: Permission of CMNS-Mathematics department.
Additional Information: Math majors may not use this course to fulfill the upper-level math requirement.

MATH480 Algebra for Middle School Teachers (3 Credits)
Prepares teachers with elementary certification to teach Algebra 1 in middle school. Focuses on basic algebra concepts and related theoretical ideas.
Prerequisite: MATH214.
Restriction: Must be a middle school teacher; and permission of CMNS-Mathematics department.
Credit Only Granted for: MATH480 or MATH483.
Additional Information: Not applicable to MATH/STAT major or minor requirements.

MATH481 Statistics and Data Analysis for Middle School Teachers (3 Credits)
Prepares teachers with elementary certification to teach simple data analysis and probability in middle school. Focuses on understanding basic statistics, data analysis, and related theoretical ideas.
Prerequisite: MATH214.
Restriction: Must be a middle school teacher; and permission of CMNS-Mathematics department.
Credit Only Granted for: MATH481 or MATH485.
Additional Information: Not applicable to MATH/STAT major or minor requirements.

MATH484 Geometry for High School Teachers (3 Credits)
Focuses on concepts related to geometry, including several geometry axiom schemes, transformations, and similarity. Includes constructions with Geometer's Sketchpad.
Prerequisite: MATH141; or students who have taken courses with comparable content may contact the department.
Restriction: Senior standing.
Credit Only Granted for: MATH482, MATH484, or MATH498E.
Formerly: MATH498E.

MATH487 Number for Middle Grades Teachers (3 Credits)
The rational number and proportional reasoning concepts developed in the middle grades and the larger mathematical context for these. Multiple representations of relationships, including verbal descriptions, diagrams, tables, graphs, and equations. Common misconceptions.
Prerequisite: Must have admission to M.A. or M.Ed. with concentration in Mathematics Education; or permission of CMNS-Mathematics department.
Restriction: This course may not be used towards the upper level math requirements for the MATH/STAT major.
Credit Only Granted for: MATH487 or MATH498K.
Formerly: MATH498K.

MATH489 Research Interactions in Mathematics (1-3 Credits)
Students participate in a vertically integrated (undergraduate, graduate and/or postdoctoral, faculty) mathematics research group. Format varies. Students and supervising faculty will agree to a contract which must be approved by the department. Up to three credits of MATH489 may be applied to the mathematics degree requirements. See the department's MATH489 online syllabus for further information.
Prerequisite: Permission of CMNS-Mathematics department.
Repeatable to: 10 credits if content differs.

MATH498 Selected Topics in Mathematics (1-9 Credits)
Topics of special interest to advanced undergraduate students will be offered occasionally under the general guidance of the departmental committee on undergraduate studies.
Repeatable to: 9 credits if content differs.

MATH600 Abstract Algebra I (3 Credits)
Groups with operators, homomorphism and isomorphism theorems, normal series, Sylow theorems, free groups, Abelian groups, rings, integral domains, fields, modules. Topics may include HOM (A,B), Tensor products, exterior algebra.
Prerequisite: MATH405 and MATH403; or students who have taken courses with comparable content may contact the department.

MATH601 Abstract Algebra II (3 Credits)
Field theory, Galois theory, multilinear algebra. Further topics from: Dedekind domains, Noetherian domains, rings with minimum condition, homological algebra.
Prerequisite: MATH600.

MATH602 Homological Algebra (3 Credits)
Projective and injective modules, homological dimensions, derived functors, spectral sequence of a composite functor. Applications.
Prerequisite: MATH600.

MATH603 Commutative Algebra (3 Credits)
Ideal theory of Noetherian rings, valuations, localizations, complete local rings, Dedekind domains.
Prerequisite: MATH600.

MATH606 Algebraic Geometry I (3 Credits)
Prime and primary ideals in Noetherian rings, Hilbert Nullstellensatz, places and valuations, prevarieties (in the sense of Serre), dimension, morphisms, singularities, varieties, schemes, rationality.
Prerequisite: MATH600 and MATH601.

MATH607 Algebraic Geometry II (3 Credits)
Topics in contemporary algebraic geometry chosen from among: theory of algebraic curves and surfaces, elliptic curves, Abelian varieties, theory of schemes, theory of zeta functions, formal cohomology, algebraic groups, reduction theory.
Prerequisite: MATH606.

MATH620 Algebraic Number Theory I (3 Credits)
Algebraic numbers and algebraic integers, algebraic number fields of finite degree, ideals and units, fundamental theorem of algebraic number theory, theory of residue classes, Minkowski's theorem on linear forms, class numbers, Dirichlet's theorem on units, relative algebraic number fields, decomposition group, inertia group and ramification group of prime ideals with respect to a relatively Galois extension.
Prerequisite: MATH601.

MATH621 Algebraic Number Theory II (3 Credits)
Valuation of a field, algebraic function fields, completion of a valuation field, ramification exponent and residue class degree, ramification theory, elements, differents, discriminants, product formula and characterization of fields by the formula, Gauss sum, class number formula of cyclotomic fields.
Prerequisite: MATH600. And MATH620; or students who have taken courses with comparable content may contact the department.

MATH630 Real Analysis I (3 Credits)
Lebesgue measure and the Lebesgue integral on R, differentiation of functions of bounded variation, absolute continuity and fundamental theorem of calculus, Lp spaces on R, Riesz-Fischer theorem, bounded linear functionals on Lp, measure and outer measure, Fubini's theorem.
Prerequisite: MATH411; or students who have taken courses with comparable content may contact the department.

MATH631 Real Analysis II (3 Credits)
Abstract measure and integration theory, metric spaces, Baire category theorem and uniform boundedness principle, Radon-Nikodym theorem, Riesz Representation theorem, Lebesgue decomposition, Banach and Hilbert Spaces, Banach-Steinhaus theorem, topological spaces, Arzela-Ascoli and Stone-Weierstrass theorems, compact sets and Tychonoff's theorem.
Prerequisite: MATH630.

MATH632 Functional Analysis (3 Credits)
Introduction to functional analysis and operator theory: normed linear spaces, basic principles of functional analysis, bounded linear operators on Hilbert spaces, spectral theory of selfadjoint operators, applications to differential and integral equations, additional topics as time permits.
Prerequisite: MATH631.

MATH634 Harmonic Analysis (3 Credits)
L1 theory: Fejer theorem, inversion theorem, ideal structure, Tauberian theorem. L2 theory: Plancherel-Parseval theorems, Paley-Wiener theorem. Lp theory: Hausdorff-Young theorem. Distribution theory: Bochner's theorem, Wiener continuous measures theorem, Malliavin theorem, Schwartz theory, almost periodic functions.
Prerequisite: MATH630.

MATH636 Representation Theory (3 Credits)
Introduction to representation theory of Lie groups and Lie algebras; initiation into non-abelian harmonic analysis through a detailed study of the most basic examples, such as unitary and orthogonal groups, the Heisenberg group, Euclidean motion groups, the special linear group. Additional topics from the theory of nilpotent Lie groups, semisimple Lie groups, p-adic groups or C-algebras.
Prerequisite: MATH631.

MATH642 Dynamical Systems I (3 Credits)
Foundations of topological dynamics, homeomorphisms, flows, periodic and recurrent points, transitivity and minimality, symbolic dynamics. Elements of ergodic theory, invariant measures and sets, ergodicity, ergodic theorems, mixing, spectral theory, flows and sections. Applications of dynamical systems to number theory, the Weyl theorem, the distribution of values of polynomials, Vander Waerden's theorem on arithmetic progressions.
Prerequisite: MATH432. And MATH630; or students who have taken courses with comparable content may contact the department.

MATH643 Dynamical Systems II (3 Credits)
Entropy theory, variational principle for the entropy, expansiveness, measures with maximal entropy. Smooth systems on manifolds, diffeomorphisms and flows, periodic points, stable and unstable manifolds, homoclinic points, transversality, the Krupka-Smale theorem, Morse-Smale systems. Hyperbolicity, Anosov systems, distributions and foliations, strange attractors, Bowen's measure.
Prerequisite: MATH642; or students who have taken courses with comparable content may contact the department.

MATH660 Complex Analysis I (3 Credits)
Linear transformations, analytic functions, conformal mappings, Cauchy's theorem and applications, power series, partial fractions and factorization, elementary Riemann surfaces, Riemann's mapping theorem.
Prerequisite: MATH410; or students who have taken courses with comparable content may contact the department.

MATH661 Complex Analysis II (3 Credits)
Introduction to techniques of several complex variables, with focus on geometric topics: Hartogs phenomena, Cousin problems, Dolbeault cohomology, L2 techniques, embedding of Stein manifolds, and the theory of coherent analytic sheaves.
Prerequisite: MATH630 and MATH660.

MATH669 Selected Topics in Riemann Surfaces (1-3 Credits)
Construction of Riemann surfaces, hyperbolic geometry, Fuchsian and Kleinian groups, potential theory, uniformisation spaces of meromorphic functions, line bundles, Picard variety, Riemann-Roch, Teichmueller theory.
Restriction: Permission of instructor.
Repeatable to: 99 credits if content differs.

MATH670 Ordinary Differential Equations I (3 Credits)
Existence and uniqueness, linear systems usually with Floquet theory for periodic systems, linearization and stability, planar systems usually with Poincare-Bendixson theorem.
Prerequisite: MATH405. And MATH410; or students who have taken courses with comparable content may contact the department. Cross-listed with A MSC670.
Credit Only Granted for: AMSC670 or MATH670.

MATH671 Ordinary Differential Equations II (3 Credits)
The content of this course varies with the interests of the instructor and the class. Stability theory, control, time delay systems, Hamiltonian systems, bifurcation theory, and boundary value problems.
Prerequisite: MATH630. Cross-listed with: AMSC671.
Credit Only Granted for: AMSC671 or MATH671.

MATH673 Partial Differential Equations I (3 Credits)
Analysis of boundary value problems for Laplace's equation, initial value problems for the heat and wave equations. Fundamental solutions, maximum principles, energy methods. First order nonlinear PDE, conservation laws. Characteristics, shock formation, weak solutions. Distributions, Fourier transform.
Prerequisite: MATH411; or students who have taken courses with comparable content may contact the department. Cross-listed with AMSC67 3.
Credit Only Granted for: AMSC673 or MATH673.

MATH674 Partial Differential Equations II (3 Credits)
Boundary value problems for elliptic partial differential equations via operator-theoretic methods. Hilbert spaces of functions. Duality, weak convergence. Sobolev spaces. Spectral theory of compact operators. Eigenfunction expansions.
Prerequisite: MATH673 or AMSC673; or permission of instructor. Also offered as: AMSC674.
Credit Only Granted for: AMSC674 or MATH674.

MATH689 Research Interactions in Mathematics (1-3 Credits)
The students participate in a vertically integrated (undergraduate, graduate and/or postdoctoral, faculty) research group. Format varies, but includes regular meetings, readings and presentations of material. See graduate program's online syllabus or contact the graduate program director for more information.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

MATH695 Teaching Seminar (1 Credit)
A course intended for first year teaching assistants. Topics include: everyday mechanics of teaching; teaching methods and styles; technology; course enrichment, diversity in the classroom; sexual harassment; teacher-student interactions; presentations by students.
Restriction: Must be in one of the following programs (Mathematics (Doctoral); Mathematics (Master's); Mathematical Statistics (Doctoral); Applied Mathematics and Scientific Computation (Master's); Mathematical Statistics (Master's); Applied Mathematics and Scientific Computation (Doctoral)).

MATH712 Mathematical Logic I (3 Credits)
Sentential logic, first-order languages, models and formal deductions. Basic model theory including completeness and compactness theorems, other methods of constructing models, and applications such as non-standard analysis.

MATH713 Mathematical Logic II (3 Credits)
Incompleteness and undecidability results of Godel, Church, Tarski and others. Recursive function. Basic proof theory and axiomatic set theory.
Prerequisite: MATH712.

MATH730 Fundamental Concepts of Topology (3 Credits)
Survey of basic point set topology, fundamental group, covering spaces, Van Kampen's theorem, simplicial complexes, simplicial homology, Euler characteristics and classification of surfaces.
Prerequisite: MATH403, MATH410, and MATH411; or students who have taken courses with comparable content may contact the department.

MATH734 Algebraic Topology (3 Credits)
Singular homology and cohomology, cup products, Poincare duality, Eilenberg-Steenrod axioms, Whitehead and Hurewicz theorems, universal coefficient theorem, cellular homology.
Prerequisite: MATH403; or students who have taken courses with comparable content may contact the department.
Recommended: MATH730.

MATH740 Fundamental Concepts of Differential Geometry (3 Credits)
Manifolds, tangent vectors and differential forms, Riemannian metrics, connections, curvature, structure equations, geodesics, calculus of variations.
Prerequisite: MATH405, MATH411, and MATH730; or students who have taken courses with comparable content may contact the department.

MATH742 Geometric Analysis (3 Credits)
Calculus of Variations, Bochner technique, Morse theory, weak solutions and elliptic regularity, maximum principle for elliptic and parabolic equations, Green's function of the Laplacian, isoperimetric and Sobolev inequalities, continuity method, curvature and comparison results, harmonic maps, curvature prescription problems.
Prerequisite: MATH673 and MATH674; or MATH740.

MATH744 Lie Groups I (3 Credits)
An introduction to the fundamentals of Lie groups, including some material on groups of matrices and Lie algebras.
Prerequisite: MATH405, MATH403, MATH411, and MATH432; or students who have taken courses with comparable content may contact the department.

MATH799 Master's Thesis Research (1-6 Credits)

MATH808 Selected Topics in Algebra (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

MATH818 Selected Topics in Logic (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

MATH848 Selected Topics in Geometry and Topology (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

MATH858 Selected Topics in Analysis (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

MATH868 SelectedTopics in Complex Analysis (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

MATH898 Pre-Candidacy Research (1-8 Credits)

MATH899 Doctoral Dissertation Research (1-8 Credits)

MEES - Marine-Estuarine-Environmental Sciences

MEES432 Physiological Ecology of Animals (3 Credits)
An examination of the influence of environmental constrains on animal function and energetic efficiency in the context of abiotic conditions in the habitats occupied by individuals.
Prerequisite: BSCI361; or students who have taken courses with comparable content may contact the department; or permission of instructor.
Credit Only Granted for: MEES498E, MEES698E, MEES432, or MEES632.
Formerly: MEES498E.

MEES498 Topics in Marine-Estuarine-Environmental Sciences (1-4 Credits)
Lecture and/or laboratory series organized to study a selected area of marine-estuarine-environmental sciences not otherwise considered in formal courses.

MEES604 Biometry (3 Credits)
Application of inferential statics to environmental data, design a sound experiments and studies, and a working knowledge of R.
Credit Only Granted for: BIOM601, MEES604, MEES698B.
Formerly: MEES698B.

MEES605 Energy and Environment (3 Credits)
Role of energy in environmental and human-dominated systems and their linkage. Discussion of the historical and modern production and consumption of energy. Energy systems simulation modeling, energy analysis and energy auditing. Review of national energy policies and proposed alternatives.
Prerequisite: MATH120; or must have completed MATH220; or students who have taken courses with comparable content may contact the department. Cross-listed with ENST605.
Credit Only Granted for: ENST405, ENST605, MEES605, or MEES698Z.
Formerly: MEES698Z.

MEES606 Cell and Molecular Biology for Environmental Scientists (4 Credits)
An invisible world courses through every living thing. This is the world of molecules, tiny machines millions of time smaller than the machines we are most familiar with, like automobiles. Individually, each of the molecules is a delicate instrument, measuring, making, weighing, and building the thing we call life. The molecules of living things are unique among the molecules of the Earth. These tiny molecular messengers, engines, and machines are built to perform highly specific tasks unlike the molecules formed by physical processes.
Prerequisite: An undergraduate course in cell biology or biochemistry.
Credit Only Granted for: MEES698C or MEES606.
Formerly: MEES698C.

MEES607 Quantitative Methods in Environmental Sciences (3 Credits)
Mathematical approaches and solutions (both analytical and numerical) that cut across environmental disciplines, and will introduce analytical techniques.
Prerequisite: MATH120 and MATH121; or must have completed MATH220 and MATH221; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: MEES607 or MEES698G.
Formerly: MEES698G.

MEES608 Seminar in Marine-Estuarine-Environmental Sciences (1-2 Credits)

MEES609 Professional Development in Marine Estuarine Environmental Science (1-3 Credits)
Training designed for existing and future careers.
Repeatable to: 20 credits if content differs.

MEES610 Land Margin Interactions (4 Credits)
Broad overview of the components and biogeochemistry of the coastal zone(atmosphere, land, streams, wetlands, estuaries) and the time and space scales on which interactions occur between components. Includes 4 h of classes per week with readings from the literature, field trips, a term paper, and a forum. Course is taught on the Interactive Video Network.
Credit Only Granted for: MEES610 or MEES698I.
Formerly: MEES698I.

MEES611 Estuarine Systems Ecology (3 Credits)
A broad systems perspective on the important components and processes of estuarine ecosystems, with quantitative and/or mathematical treatment toward development of representative models for estuarine dynamics.

MEES614 Spatial Ecology in R (4 Credits)
Many ecological questions in terrestrial and marine systems originate from the observation that organisms and the ecological processes that influence them vary in space. This course emphasizes the study of spatial ecological patterns (including animal movement), the processes that generate and maintain these patterns and processes, and the construction of models in R to analyze, simulate, and understand the interplay between spatial pattern, ecological processes, and scale. The objective of the course is to introduce students to ecological theories and concepts relevant to the study of spatial ecological patterns in terrestrial and marine systems, while providing the R skills necessary to articulate and answer scientific questions by confronting models with data.
Restriction: Permission of instructor.

MEES617 Hydrological Effects of Land Use Change (3 Credits)
Detailed examination of the catchment-scale hydrological effects attributable to major land use and land cover alterations, including both anthropic and non-anthropic disturbances.
Prerequisite: Statistics course and hydrology course or permission of instructor.

MEES620 Environment and Society (3 Credits)
Students will obtain foundational knowledge of core theories and methods that integrate cultural and socio-economic research into environmental science. Key topics include: coupled natural and human systems, cultural models of the environment, social networks, ecological economics, political ecology, environmental justice, and science communication.Cross-listed with: ANTH620.
Credit Only Granted for: ANTH620 or MEES620.
Additional Information: Offered over the interactive video network.

MEES621 Biological Oceanography (4 Credits)
Population and community ecology of estuarine and marine systems; coastal and estuarine processes are emphasized in the context of oceans in general. Field and lab trips required.

MEES622 Sustainability Science: quantitative and systems approach (3 Credits)
Modern sustainability science goes beyond single-resource management and integrates biophysical and socio-economic considerations of sustainability. This course is designed to help provide students with a historical background, critical thinking approaches, and analytical tools to address sustainability from a scientific perspective.

MEES626 Environmental Geochemistry I (3 Credits)
Brief overview of biogeochemical cycles; fundamental aquatic chemistry that can be applied to a variety of environmental systems.
Recommended: Completion of one semester of physical chemistry is recommended.
Restriction: Permission of instructor.
Credit Only Granted for: MEES626 or MEES698L.
Formerly: MEES698L.

MEES627 Environmental Geochemistry II (3 Credits)
Detailed examination of aquatic geochemical cycles, including inorganic and organic geochemistry. Topics include global biogeochemical cycles, estuarine cycling, redox cycles, radiochemistry, stable isotope biogeochemistry and sediment biogeochemistry/diagenesis.
Prerequisite: MEES626; or permission of instructor.
Credit Only Granted for: MEES627 or MEES698K.
Formerly: MEES698K.

MEES631 Fish Ecology (3 Credits)
Study of the interrelationships between individuals, their communities and environment. Explores the environmental biology of fish, feeding ecology, energetics and growth, population biology, reproduction and life history, and population and community interactions.
Restriction: Permission of instructor.

MEES632 Physiological Ecology of Animals (3 Credits)
An examination of the influence of environmental constrains on animal function and energetic efficiency in the context of abiotic conditions in the habitats occupied by individuals.
Credit Only Granted for: MEES698E, MEES498E, MEES432, MEES632.
Formerly: MEES698E.

MEES637 Zooplankton Ecology (3 Credits)
A quantitative investigation of zooplankton ecology, emphasizing population dynamics and modeling, feeding, behavior, food-webs, and bio-physical interactions.
Prerequisite: MEES621; or permission of instructor.
Credit Only Granted for: MEES698G, MEES637.
Formerly: MEES698G.

MEES640 Interconnected Earth Systems: Land, Ocean, and Estuary (3 Credits)
Explores the interconnected physical and biogeochemical systems of land, estuary, and ocean with cross cutting themes of human impacts and global change. Broad concepts will be combined with targeted interactive case studies to demonstrate how these systems are linked by humans, climate, and water.

MEES650 Advanced Wetland Ecology (3 Credits)
Plant and animal communities, biogeochemistry, and ecosystem properties of wetlands. Lectures are supplemented by field trips (normally 2 days total during the semester) and in-class labs. Hands-on activities and exercises include identification of wetland plant species, wetland mapping and delineation, and collection and analysis of field data on wetland vegetation, soil, and hydrology. Wading boots (at least hip length) are strongly recommended.
Prerequisite: BIOM301; and ENST360 or other ecology equivalent; or permission of AGNR-Environmental Science and Technology department; or permission of CMNS-Marine & Estuarine-Environmental Science Program). Cross-listed with: ENST650. Jointly offered with: ENST450, MEES650.
Credit Only Granted for: ENST450, ENST650, or MEES650.
Additional Information: Wading boots (at least hip length) are strongly recommended.

MEES660 Ecological Systems (3 Credits)
An introduction to the field of ecology is provided for matriculating graduate students and prepares them for more advanced concepts. Students will be exposed to ecology both in theory and practice through lectures, readings, and quantitative exercises, round table debates and discussions with current practitioners.

MEES661 Physics of Estuarine and Marine Environments (3 Credits)
General introduction to the physical oceanography of estuarine and marine systems. Physical characteristics of seawater, heat and mass transport, major ocean currents, basic dynamical oceanography, surface waves, tides, turbulence, sediment transport, estuarine circulation.
Prerequisite: Must have completed one year of physics coursework; and must have completed one year of calculus coursework. Or permission of instructor.

MEES670 Conservation Biology (3 Credits)
Conservation in the Anthropocene means conserving biodiversity and ecosystem function in the midst of climate change, habitat loss, overexploitation, altered nutrient cycling, and invasive species with protected areas and reserve networks, ecosystem restoration, and other biodiversity conservation and management schemes.Cross-listed with CONS670.
Credit Only Granted for: CONS670 or MEES670.

MEES671 Remote Sensing for Environmental Management (4 Credits)
Coverage of tools necessary to carry out remote sensing studies of ecosystem pattern and process, land-use and land-cover change and the impact of climate changes. General overview of recent research at the interface of remote sensing, ecosystem analysis, global change, and environmental management.
Credit Only Granted for: MEES671, MEES698X.
Formerly: MEES698X.

MEES680 Cell and Molecular Biology for the Environmental Scientist-From Genes to Ecosystems (3 Credits)
Introduces environmental scientists to the methods and approaches that are the foundations for today's breakthroughs in molecular and cellular biology. Detailed examination of papers published in the last few years along with online background materials will be used to reinforce the connection of key concepts to experimentation.

MEES681 Advanced Ecological Design (3 Credits)
An advanced survey course on the field of ecological design. Principles of design are illustrated with case studies from biologically-based waste treatment systems, ecosystem management and sustainable development.
Prerequisite: Must have completed one semester of calculus; and (CHEM131 and PHYS121). Or permission of instructor. Cross-listed with E NST681.
Credit Only Granted for: ENST481, ENST681, or MEES681.

MEES682 Fishery Science and Management (3 Credits)
Aquatic production and fisheries yields. Introduction to fish population dynamics and assessment methods. Effects of fishing on resource potential yields. Causes of fluctuations in resource abundance. An emphasis on the relationship between science and management.
Restriction: Permission of instructor.

MEES684 Marine Microbial Ecology (3 Credits)
The primary goal of this course is to become familiar with the diversity, ecology, and biogeochemical roles of Bacteria, Archaea, microbial Eukaryotes, viruses, and fungi in the marine environment. The course will also cover the latest discoveries in molecular microbial ecology. Each main topic will begin with a lecture and will be followed by a paper discussion. For the paper discussions, each student will present selected papers specified in the syllabus (or by consensus with the course instructors). Students will also participate in class discussions.

MEES698 Special Topics in Marine-Estuarine-Environmental Sciences (1-4 Credits)
Credit according to time schedule and course organization. Lecture and/or laboratory series organized to study selected areas of environmental science not otherwise considered by existing courses. May be repeated for credit since topic coverage will change.

MEES699 Special Problems in Marine-Estuarine-Environmental Sciences (1-3 Credits)
Research on specialized topics under the direction of individual faculty members.

MEES708 Advanced Topics in Marine-Estuarine-Environmental Science (1-4 Credits)
Lectures, experimental courses and other specialized graduate training in various relevant disciplines.
Repeatable to: 12 credits if content differs.

MEES712 Advanced Population Dynamics and Assessment (4 Credits)
Quantitative and modeling skills, including understanding of population dynamics and responses of populations to exploitation and management actions. Coverage of population models of production, mortality, stock and recruitment, age and growth, and harvesting, and methods for using these models to provide management advice.
Prerequisite: MEES607 or BIOM601; or permission of instructor.
Credit Only Granted for: MEES698D or MEES712.
Formerly: MEES698D.

MEES718 Study Groups on Issues in Marine Estuarine Enviornmental Sciences (1-2 Credits)
Active discussions on current environmental topics and issues. Efforts may result in manuscripts, technical report or innovative communication products.
Prerequisite: MEES601 or MEES609A; or permission of the advising committee and instructor.
Repeatable to: 6 credits if content differs.

MEES743 Aquatic Toxicology (3 Credits)
Comprehensive course in which a definitive description of basic concepts and principles, laboratory testing and field situations, as well as examples of typical data and their interpretation and use by industry and water resource managers, will be discussed. The toxicological action and fate of environmental pollutants will be examined in aquatic ecosystems, whole organisms and at the cellular, biochemical and molecular levels.

MEES799 Masters Thesis Research (1-6 Credits)

MEES898 Pre-Candidacy Research (1-8 Credits)

MEES899 Doctoral Dissertation Research (1-8 Credits)

MIEH - Maryland Institute for Applied Environmental Health

MIEH400 Introduction to Global Health (3 Credits)
Exploration of theoretical frameworks and practical perspectives on issues shaping the global health panorama. Determinants examined through: biological and epidemiological; social, cultural and economic; environmental and geographic; multi-section, legal and institutional perspectives with synopsis of how these issues are addressed by international and community organizations in developing countries.
Prerequisite: Minimum grade of C- in MIEH300; and 1 course with a minimum grade of C- from (SPHL100, PHSC300).
Restriction: Must be in the Public Health Science program or must have permission of the program director; and must have completed 60 credits.
Credit Only Granted for: MIEH400 or SPHL498A.
Formerly: SPHL498A.

MIEH480 Introduction to Occupational Health (3 Credits)
An introduction to the field of occupational health and safety. Introduction to basic concepts in occupational safety and health, as well as the methods used to anticipate, recognize, evaluate, and control environmental factors or stresses arising in or from the workplace. In addition to instructor-led lectures, guest speakers will be invited to discuss case studies and/or discuss workplace hazards unique to specific populations.
Prerequisite: Minimum grade of C- in MIEH300.
Recommended: BSCI201; and EPIB301.
Restriction: Must be in a major in SPHL-School of Public Health.

MIEH600 Foundations of Environmental Health (3 Credits)
Overview of the chemical, physical and biological hazards present in our living and working environment and their effects on human health. Topics include: exposure assessment, industrial hygiene and safety, pesticides, community and indoor pollution, food-borne diseases, solid and hazardous wastes, water resources, risk assessment, ecological issues and environmental laws.
Credit Only Granted for: HLTH761 or MIEH600.
Formerly: HLTH761.

MIEH605 Fundamentals of Global Health (3 Credits)
Exploration of theoretical frameworks and practicial perspectives in global health with particular attention to the analysis of the biological, epidemiological, social, cultural and behavioral interactions that affect global health study and project implementation. The emphasis is on innovative solutions to health issues in underserved populations.
Credit Only Granted for: SPHL600 or SPHL698A.
Formerly: SPHL698A.

MIEH609 Methods in Environmental Health (1-3 Credits)
This research-based rotation in environmental health sciences will provide graduate students with the opportunity to work closely with faculty researchers in the Maryland Institute for Applied Environmental Health (MIAEH) within the School of Public Health. Our research covers multiple fields within the environmental health sciences (e.g. environmental epidemiology, exposure science, risk assessment, environmental microbiology, environmental microbiology, environmental microbial genomics, food toxicology, airborne infection transmission, environmental justice, and children's environmental health) that involve either laboratory-based research or non-laboratory based studies. Students will not only gain invaluable research experience and interpersonal skills but also contribute to MIAEH's ongoing environmental health research programs.
Repeatable to: 6 credits.

MIEH610 Global Health Program Planning and Evaluation (3 Credits)
Development of health program and evaluation plans to address critical health problems in international settings, especially transitional or in-conflict countries. Emphasis on linking a tactical program plan to overall health problems of a nation, to include the policy and economic issues involved in assessment, implementation and evaluation.
Recommended: MIEH605.
Credit Only Granted for: MIEH610, SPHL610 or SPHL698D.
Formerly: SPHL698D and SPHL610.

MIEH620 Global Health Communication and Promotion (3 Credits)
Explores the critical components in developing, implementing and evaluating health/population promotion and communication interventions. Emphasis is on theory application to a variety of cultural settings. Formative and quantitative research methods will be utilized.
Recommended: MIEH605.
Credit Only Granted for: SPHL620 or SPHL698C.
Formerly: SPHL698C.

MIEH688 Seminar in the Maryland Institute for Applied Environmental Health: Current Topics in Environmental Health (1 Credit)
Invited and in-house research presentations from guest scientists, faculty members, and students, and critical analysis of journal articles on current topics in environmental and occupational health.
Repeatable to: 3 credits.

MIEH690 UMD Global STEWARDS: Experiential Exploration of Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS) (3 Credits)
Experiential introduction to broad food, energy, water (FEW) nexus topics, focusing on how integration across the biological, physical, social, behavioral, computer and engineering sciences will be critical in solving FEW systems challenges. FEW nexus issues from molecular to societal levels and from local to global scales will be covered. Course meetings will include active learning-based lectures, discussions, on-campus and off-campus field trips, hands-on activities, brainstorming about interdisciplinary FEW systems projects, and guest lectures.
Restriction: Permission of instructor; and must be in UMD Global STEWARDS Fellows.

MIEH691 UMD Global STEWARDS: Project-Based Data Practicum at the Nexus of Food, Energy, and Water Systems (3 Credits)
The range of food-energy-water (FEW) systems challenges from local to global scales. During the semester, students will gain real-world experience by participating in the conceptualization and/or conduct of an interdisciplinary FEW systems project. Projects may employ engineering, life sciences, epidemiological or policy approaches; earth system sciences frameworks; computational methods; and/or other innovative approaches. Through this work, students will gain hands-on experience in study design, research methods, and data analysis across varying FEW disciplines. Each student will bring a diverse set of expertise to the projects, creating a microcosm for interdisciplinary team science. During the course, students will have the opportunity to refine oral and written communication skills, including team writing. The deliverable for the course may include a grant proposal, a manuscript, a FactSheet, an Op-Ed, or another actionable type of science/policy writing.
Prerequisite: MIEH690,.
Restriction: Permission of instructor; and must be in UMD Global STEWARDS Fellows.

MIEH698 Special Topics in Environmental Health (1-3 Credits)
Special topics in environmental health.
Repeatable to: 12 credits if content differs.

MIEH699 UMD Global STEWARDS: Seminal Findings, and Research and Policy in Progress at the Food, Energy, Water Nexus (1 Credit)
Engaging discourse covering seminal findings, as well as research and policy in progress at the food, energy, water (FEW) nexus. Course meetings will include dissections of groundbreaking FEW nexus articles; presentations by faculty members and students, followed by interdisciplinary discussions; and presentations by visiting leaders working at the FEW nexus across career sectors.
Restriction: Permission of instructor.
Repeatable to: 3 credits.

MIEH700 Advanced Environmental Health (3 Credits)
An advanced doctoral course in environmental health science focused on the application of knowledge gained in foundational and scientific methods courses to solve environmental health problems. The course will engage students in: problem identification; critical evaluation of the existing state of scientific knowledge and gaps regarding the problem; selection and use of appropriate scientific methods to assess the problem; generation of accurate conclusions based on critical evaluation of the findings; and, finally, accurate communication of findings, uncertainties and conclusions to various target audiences and stakeholders.
Prerequisite: MIEH600 and MIEH780; and permission of instructor.

MIEH720 Principles of Toxicology (3 Credits)
Overview of toxicology, including exposure pathways, toxicokinetics, dermal toxicants, carcinogens, and genetic, reproductive, immuno-, nuero-, target organs, complex mixtures, structure-activity analysis, and determinants of hypo- and hyper-susceptibility. Case studies of global national and regional interest.
Prerequisite: MIEH600; or permission of instructor.
Recommended: Must have completed some coursework in chemistry and/or biology.

MIEH721 Physiological Toxicology (3 Credits)
Emphasis on macromolecular, metabolic, cellular, and physiologic targets of environmental contaminants and assays to detect toxic effects at these levels. Discussion of effects of select environmental toxicants in the context of their disruption of normal processes. Examination of the design of short-term assays and their desirable features to maximize usefulness for predicting human disease.
Prerequisite: MIEH600.
Recommended: Must have completed coursework in chemistry, biology, biochemistry, and genetics.

MIEH722 Laboratory Methods in Environmental Health (3 Credits)
Application of chemical principles to environmental monitoring. Basic sampling techniques and laboratory tests to determine chemical and microbiological pollutants in water, air and soil from field-collected samples.
Prerequisite: MIEH600.
Recommended: Must have completed coursework in analytical chemistry, microbiology, biochemistry.

MIEH725 Environmental Analysis (3 Credits)
Fundamentals of environmental chemistry and in environmental media (water, air, soil) and in biota. Theory of sampling, chemical analysis and quality control for major environmental contanimants. Introduction to spatial and statistical analysis, use of maps and Geographic Information Systems, and use of environmental anaylsis in remediation and pollution prevention.
Prerequisite: MIEH600.
Recommended: MIEH722.

MIEH730 Environmental Justice, Built Environment, and Health Disparities (3 Credits)
This course will give students the opportunity to conduct an in-depth analysis of environmental justice and environmental racism in the United States and internationally. Students will synthesize their knowledge from environmental science courses with the concepts of civil rights and social justice to more fully understand the existing health disparities and how the built environment contributes to them.
Prerequisite: Must have completed an Environmental Health course.

MIEH735 Food Toxicology (3 Credits)
An introduction to basic concepts in toxicology in relation to toxic food contaminants and additives; both synthetic and naturally occurring. Focus on exposure routes, molecular targets and susceptible individuals. Also includes regulatory toxicology with respect food toxins.
Recommended: BCHM462, BSCI440, or CHEM131. Cross-listed with NFSC735.
Credit Only Granted for: MIEH735 or NFSC735.

MIEH740 Environmental Health Risk Assessment (3 Credits)
Review of the major methods of human and ecological risk assessment conducted by the U.S. Environment Protection Agency. Emphasis on sources of uncertainty.
Prerequisite: MIEH600; or permission of instructor.

MIEH742 Principles of Industrial Hygiene (3 Credits)
Theory and practice of industrial hygiene, including major industrial exposures and their sampling and measurement. Focus on specific industries, work populations, and environments.
Prerequisite: MIEH600 and MIEH720.

MIEH760 Spatial Epidemiology (3 Credits)
The purpose of this survey course is to provide students with an introduction to spatial resources and methods specific to public health, with an emphasis on epidemiology and environmental applications. Students will be introduced to spatial resources, concepts, and tools relevant to public health research and practice. They will acquire skills to interpret, evaluate, and design basic public health spatial research projects; and to conduct simple spatial analyses.
Prerequisite: Must have completed an Introduction biostatistics course.
Recommended: Completion of a graduate epidemiology course, or environmental health course, or geography/GIS course.

MIEH770 Law and Policy in Environmental Health (3 Credits)
Overview of laws that affect the environment, and the various ways in which businesses are regulated by the government in the interest of protecting the environment. International, Federal, state, and local laws and regulations related to the protection of human health and the regulation of environmental containments, including biological, physical and chemical factors affecting community health. Examination of the interactions between and differing responsibilities of various agencies enforcing environmental laws and regulations.
Prerequisite: MIEH600; or permission of instructor.

MIEH771 Exposure Assessment of Environmental Hazards (3 Credits)
Approaches and methods for determining exposure to environmental contaminants. Biomonitoring and genetic methods to detect recent exposures. Optimizing exposure assessment.
Prerequisite: MIEH600; and must have completed a graduate level statistics course with a B- or higher. Or permission of instructor.

MIEH773 Foodborne, Waterborne and Airborne Infectious Diseases (3 Credits)
In-depth study of foodborne, waterborne and airborne diseases caused by bacteria, viruses and parasites. Topics will include sources and detection of causative agents; their transmission to humans via food, water, air and other environmental media; and methods of disease prevention, including food safety approaches and drinking water treatment. Classes include lectures, discussions, field-trips and hands-on field sampling and laboratory activities.
Corequisite: MIEH600; or permission of instructor.

MIEH778 Internship in Public Health (1-4 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Restriction: Permission of SPHL-Maryland Institute for Applied Environmental Health.
Repeatable to: 4 credits.
Credit Only Granted for: MIEH785 or MIEH778.

MIEH780 Occupational Health (3 Credits)
A synthesis of epidemiology, toxicology, exposure science, risk assessment, and policy. Emphasis will be on methods for anticipating, recognizing, evaluating and controlling workplace hazards; the hierarchy of controls; and current hot topics in occupational health.
Prerequisite: MIEH720 and MIEH771; and must have completed SPHL602. Or permission of instructor.

MIEH783 Proposal Development and Marketing for Public Health Scientists (3 Credits)
Every scientist, whether in academia, government, or industry, must write compelling proposals if they are to succeed in having resources to pursue their passions and interests. To write a compelling proposal, we must develop clear and concise hypotheses and definitive ways to test them. But to have an impact, to get funded, to graduate, we must also excel at marketing our ideas and our achievements to other scientists and the public. This course is designed for doctoral students and postdoctoral fellows who want to develop and hone their proposal development and marketing skills.

MIEH785 Internship in Public Health (3 Credits)
Internship and seminar providing an opportunity to apply previously acquired knowledge and skills in a health or allied health organization. Setting of the internship will depend upon the student's background and career goals.
Restriction: Permission of SPHL-Maryland Institute for Applied Environmental Health.
Credit Only Granted for: MIEH785 or MIEH778.

MIEH786 Capstone Project in Public Health (3 Credits)
Capstone experience provding opportunity to apply knowledge and skills to a specific public health problem or issue. Completion of project relevant to public health under the direction of an advisor.
Prerequisite: Permission of SPHL-Maryland Institute for Applied Environmental Health.

MIEH788 Critical Readings in Environmental Health (1-3 Credits)
In-depth examination and critical discussion of the current literature relevant to environmental health.
Prerequisite: MIEH600.
Repeatable to: 3 credits if content differs.

MIEH789 Independent Study (1-6 Credits)
Individual reading and/or research under a specific faculty member in the department.
Prerequisite: Permission of SPHL-Maryland Institute for Applied Environmental Health.

MIEH799 Master's Thesis Research (1-6 Credits)

MIEH899 Doctoral Dissertation Research (1-8 Credits)

MITH - Maryland Institute for Technology in the Humanities

MITH498 Special Topics in Applied Digital Humanities (3 Credits)
An introduction to special topics, and technical approaches, for theoretically grounded humanities and social sciences digital research. Class meetings will introduce students to a variety of technical approaches potentially applicable to the specific topical foci; the theoretical basis for selecting, evaluating, and modifying technical approaches; and best practices in project management.
Repeatable to: 9 credits if content differs.

MITH610 Introduction to Digital Studies in the Arts and Humanities (3 Credits)
An introduction to digital studies in the arts and humanities, broadly conceived as the critical, creative, and practical engagement with digital media, methods, tools, and experiences, as well as the theoretical and conceptual bases for understanding them.

MITH729 Colloquium in Digital Studies (1 Credit)
Colloquium in support of the ARHU-MITH Graduate Certificate in Digital Studies. We will meet periodically (approximately 4-5 times a semester) to read and discuss current work in the field, interact with visiting speakers, share work in progress, learn new tools and methods, and hear research presentations from one another.
Repeatable to: 3 credits.

MITH735 Anatomy of Digital Humanities Research (3 Credits)
Positioned as a companion to a disciplinary research methods course, this course emphasizes best practices and critical approaches in the context of the lifecycle of a collaborative research project from ideation to publication to preservation. This course explores common digital methodologies as it teaches collaboration and fast prototyping to help students develop a reflexive critical approach to digital research projects. Upon completing the course, students will have a research plan, including the beginnings of a literature review, wireframes, and proposal for the lifecycle of the research project.

MITH741 Creative Ambiguities: Embodiment, Text, and the Digital Humanities (3 Credits)
The course asks what theoretical and applied research emerges out of the space of digital humanities and the performing arts. It will equip students with a nuanced overview of the history of the digital within performance and explore various technical approaches that can enable the exploration of intersections of research and practice, the connections between creation and research, and yes, even "cool" performance.
Prerequisite: MITH610; or permission of instructor.
Recommended: MITH610 and MITH735.

MLAW - MPower Undergraduate Law Programs

MLAW404 Law & Society Capstone: Implications of Technology on Law & Society (3 Credits)
An exploration of the implications of technology on law and society from a variety of perspectives.Significant issues will be taken from contemporary scholarship and court cases.
Restriction: Student must be enrolled in the Law and Society minor.

MOCB - Molecular and Cell Biology

MOCB608 Molecular and Cell Biology Seminar (1-2 Credits)
Seminar in molecular and cell biology.
Repeatable to: 5 credits if content differs.

MOCB639 Advanced Cell Biology (3 Credits)
Recent advances in key areas of modern cell biology.
Repeatable to: 6 credits if content differs.

MOCB699 Laboratory Rotation (2-3 Credits)
Laboratory experience in molecular-cell biology.
Prerequisite: Permission of CMNS-Molecular & Cell Biology Program (MCB).
Restriction: Must be in one of the following programs (Cell Biology and Molecular Genetics (Doctoral); Cell Biology and Molecular Genetics (Master's)).
Repeatable to: 6 credits if content differs.

MOCB708 Advanced Topics in Molecular and Cell Biology (1-4 Credits)
Lectures, experimental courses, and other special instructions in various areas of molecular or cell biology.
Repeatable to: 6 credits if content differs.

MOCB898 Pre-Candidacy Research (1-8 Credits)

MOCB899 Doctoral Dissertation Research (1-8 Credits)

MUED - Music Education

MUED411 Teaching Elementary Instrumental Music II (4 Credits)
Prepare instrumental-emphasis music education majors to synthesize the knowledge and skills that will enable them to develop and/or maintain an exemplary curricular-oriented, research-based, comprehensive elementary instrumental music program.
Prerequisite: MUED320 and MUED311.
Restriction: Must be in Music Education program.

MUED420 Teaching Secondary Instrumental Music II (4 Credits)
Prepare instrumental-emphasis music education majors to synthesize the knowledge and skills that will enable them to develop and/or maintain an exemplary, curricular-oriented, research-based, comprehensive secondary instrumental program.
Prerequisite: MUED320 and MUED311.
Restriction: Must be in Music Education program.

MUED422 Teaching General Music II (4 Credits)
Designed as an advanced music methods course and field experience for students who are preparing for a career in general music. The field experience is a practicum that is co-supervised by the university instructor and a general music educator.
Prerequisite: MUED322 and MUED333.
Restriction: Must be in Music Education program.
Credit Only Granted for: MUED422 or MUED471.
Formerly: MUED471.

MUED433 Teaching Choral Music (4 Credits)
Preparation for teaching choral classes through the integration of conducting technique, vocal pedagogy, knowledge of repertoire, and the application of appropriate instructional strategies in the context of peer teaching and field experience assignments.
Prerequisite: MUED422.
Restriction: Must be in Music Education program.
Credit Only Granted for: MUED472 or MUED433.
Formerly: MUED472.

MUED471 Teaching General Music II (4 Credits)
Designed as an advanced music methods course and field experience for students who are preparing for a career in general music. The field experience is a practicum that is co-supervised by the university instructor and a general music educator.
Prerequisite: MUED322 and MUED333.
Restriction: Must be in Music Education program.
Credit Only Granted for: MUED422 or MUED471.
Formerly: MUED471.

MUED472 Teaching Choral Music (4 Credits)
Preparation for teaching choral classes through the integration of conducting technique, vocal pedagogy, knowledge of repertoire, and the application of appropriate instructional strategies in the context of peer teaching and field experience assignments.
Prerequisite: MUED422.
Restriction: Must be in Music Education program.
Credit Only Granted for: MUED472 or MUED433.
Formerly: MUED472.

MUED473 Teaching General Music for Instrumentalists (2 Credits)
Introduction to current trends, materials and approaches in general music instruction.
Prerequisite: MUED311; and MUED320.
Restriction: Must be in Music Education program.

MUED474 Field Experiences: Pre-Student Teaching (2 Credits)
Field experiences to fulfill teaching requirements in K-12 music teacher education program.
Prerequisite: MUED420 and MUED411; or (MUED472 and MUED471).
Restriction: Permission of ARHU-School of Music department; and senior standing.

MUED484 Student Teaching in Elementary School: Music (6 Credits)
Fulfills elementary teaching requirements in K-12 music teacher education program. Limited to music education majors who have previously applied.
Corequisite: MUED494.
Restriction: Permission of ARHU-School of Music department; and must be in Music Education program.

MUED489 Field Experiences (1 Credit)
Series of field experiences in K-12 settings.
Restriction: Permission of ARHU-School of Music department; and must be in Music Education program.
Repeatable to: 6 credits.

MUED494 Student Teaching in Secondary School: Music (6 Credits)
Fulfill secondary teaching requirements in K-12 music teacher education program. Limited to music education majors who have previously applied.
Corequisite: MUED484.
Restriction: Permission of ARHU-School of Music department; and must be in Music Education program.

MUED499 Workshops, Clinics, Institutes (1-3 Credits)
Innovative and experimental dimensions of music education offered to meet the needs of music teachers and music supervisors allowing students to individualize their programs.
Repeatable to: 6 credits if content differs.

MUED672 Advanced Instrumental Methods in Music Education (3 Credits)
Teaching instrumental music in the K-12 setting, including recruiting, literature selection, curriculum, rehearsal techniques, and pedagogical approaches.
Restriction: Permission of ARHU-School of Music department.

MUED673 Beginning String Instruction: Principles and Applications in Group Process (3 Credits)
A survey of string instrument techniques, pedagogy, and materials for the elementary school. Includes hands-on review and extension of beginning-level string playing and teaching techniques through an organized, sequential approach.
Restriction: Permission of ARHU-School of Music department.

MUED677 Advanced Studies in Choral Music Education (3 Credits)
A critical review of choral music education in both school and community. Includes historical foundations, philosophical perspectives, and practical teaching applications in light of current scholarship.
Restriction: Permission of ARHU-School of Music department.

MUED688 Music Cultures in the Classroom II: Curriculum Materials and Teaching Strategies (3 Credits)
Designed to assist the music teacher in integrating music from selected cultures into the curriculum. Curriculum materials are presented and teaching strategies demonstrated.
Recommended: MUED687.
Restriction: Must be in a major within ARHU-School of Music department.
Repeatable to: 9 credits if content differs.

MUED690 Research Methods in Music and Music Education (3 Credits)
The application of methods of research to problems in the fields of music and music education. The preparation of bibliographies and the written exposition of research projects in the area of the student's major interest.

MUED691 Psychology of Music Teaching and Learning (3 Credits)
An overview of the psychological bases of musical behavior, with particular emphasis on the teaching and learning of music.
Restriction: Permission of ARHU-School of Music department.

MUED692 Foundations and Perspectives of Music Education (3 Credits)
An introduction to historical, sociological, and philosophical perspectives of music education.
Restriction: Permission of ARHU-School of Music department.

MUED696 Assessment in Music Education (3 Credits)
Historical and theoretical nature of assessment in education. Application and critique of various materials and approaches to assessment in music education. Development of appropriate evaluation and reporting tools.
Restriction: Permission of ARHU-School of Music department.

MUED697 Curriculum & Assessment in Music Education (3 Credits)
Theoretical and practical knowledge related to curriculum,assessment, and evaluation in music education. Course topics include: a) aspects of philosophy,sequencing, and design in music curricula; b) reliability, validity, and fairness in assessment; c) planning for and designing assessment of student knowledge and skills; d) policy, procedures, and outcomes associated with music teacher evaluation.

MUED698 Current Trends in Music Education (1-3 Credits)
A survey of current and emerging philosophies, methodologies and curricula in music education and their implementation. The influence of educational and social changes and the expanding musical scene upon the music programs for children of all ages and for teacher education.
Repeatable to: 8 credits if content differs.

MUED699 Workshops, Clinics, Institutes (1-3 Credits)
Innovative approaches to various dimensions of music education are offered to meet the pedagogical needs of music teachers. The maximum number of credits tht may be earned under this course symbol toward any degree is six semester hours; the symbol may be used two or more times unti sixsemester hours have been reached.
Repeatable to: 10 credits.

MUED729 Doctoral Colloquium in Music Education (1 Credit)
For students in PhD Progam in Music Education. Meets approximately 4-5 times per semester to read and discuss current work in the field, interact with visiting speakers, share work in progress, learn new tools and methods, and hear research presentations from one another
Restriction: Permission of instructor.
Repeatable to: 6 credits.

MUED780 Seminar in Music Teacher Education (3 Credits)
Development of knowledge and skills necessary for music teacher educators. Topics include history of and reform movements in music teacher education, recruitment, education and certification of music teachers and inservice programs.
Restriction: Must have doctoral standing in a Music Education program.

MUED785 Teaching Music in Higher Education (3 Credits)
Prepare students for music faculty positions in higher education institutions. The course readings, discussions, assignments, and experiences are aimed to develop the knowledge, skills, and dispositions necessary to be a successful member of the faculty at a variety of institutions.

MUED790 Design and Analysis of Research in Music Education (3 Credits)
Advanced applications of quantitative and qualitative social science research paradigms to research problems in the field of music education. Topics include the formation of researchable questions; the design of experimental, quasi-experimental, descriptive, and qualitative research studies; and the analysis and interpretation of research data.
Prerequisite: Must have completed a college-level statistics course. And MUED690; or an equivalent master's level research in music education course.

MUSC - School of Music

MUSC400 Music Pedagogy (3 Credits)
Conference course. A study of major pedagogical treatises in music, and an evaluation of pedagogical techniques, materials, and procedures.
Prerequisite: MUSP315; and permission of ARHU-School of Music department.

MUSC420 Introduction to Ethnomusicology (3 Credits)
Study of principal concepts and methods in ethnomusicology, covering history of field, linguistics and anthropology, music in various settings, musical cognition and ethnography of performance.
Prerequisite: MUSC210 and MUSC130; or permission of ARHU-School of Music department.
Restriction: Junior standing or higher.

MUSC428 Repertoire Coaching of Vocal or Chamber Music (2 Credits)
A course for piano students who wish to go further than the work offered in MUSC128, MUSC228 and MUSC328 by becoming specialists in the areas of vocal coaching or chamber music coaching. Elements of pedagogy, conducting and responsible artistic decision-making for the entire musical production.
Prerequisite: Must have completed or be concurrently enrolled in MUSC328.

MUSC435 Music of North America (3 Credits)
A survey of North American music from Colonial times to present.
Prerequisite: Permission of ARHU-School of Music department.

MUSC436 Jazz: Then and Now (3 Credits)
Major styles and influential artists of the past 75 years of jazz.

MUSC438 Area Studies in Ethnomusicology (3 Credits)
Advanced study of musics in selected parts of the world.
Repeatable to: 9 credits if content differs.

MUSC439 Collegium Musicum (1 Credit)
Open to undergraduates and graduates, music majors and non-majors. Procurement, edition and performance of music not belonging to a standard repertory: early music, compositions for unusual performing media, works which demand reconstruction of their original circumstances of performance. Outcome of a semester's work may be one or more performances for the public.
Prerequisite: Permission of ARHU-School of Music department.
Repeatable to: 5 credits.

MUSC443 Solo Vocal Literature (3 Credits)
The study of solo vocal literature from the Baroque Cantata to the Art Song of the present. The Lied, Melodie, vocal chamber music and the orchestral song are examined.
Prerequisite: MUSC330 and MUSC331; or students who have taken courses with comparable content may contact the department.

MUSC444 Wind and Percussion Literature (1 Credit)
Recital program notes and written projects in wind or percussion literature.
Prerequisite: Permission of ARHU-School of Music department.
Corequisite: MUSP420 or MUSP419.

MUSC445 Survey of the Opera (3 Credits)
A study of the music, librettos and composers of the standard operas.
Prerequisite: MUSC330 and MUSC331; or students who have taken courses with comparable content may contact the department.

MUSC446 String Literature (1 Credit)
Recital program notes and written projects in string literature.
Prerequisite: MUSP316; and permission of ARHU-School of Music department.

MUSC448 Selected Topics in Music (1-3 Credits)
Prerequisite: Permission of ARHU-School of Music department.
Repeatable to: 6 credits if content differs.

MUSC448E Financial Entrepreneurship for Arts Leaders (3 Credits)
An introduction to financial entrepreneurship for the arts leader in order to prepare students for diverse and ever-changing careers in the arts and creative fields. Topics explored will include Professional Paperwork (resumes, cover letters, biographies, job searches), Financial Literacy (taxes, budgets, boards, tickets sales, musicians unions), Marketing (website development, social media, press packets, record labels vs. online distribution, headshots, audience development, community engagement, branded content), Communication (public speaking, writing), and Technology (online tools, computer software, peripherals, recording, photography/videography, on campus resources).Cross-listed with: ARHU340.
Credit Only Granted for: ARHU340 or MUSC448E.

MUSC450 Musical Form (3 Credits)
A study of the principles of organization in music with emphasis on eighteenth and nineteenth century European music. Reading and analysis of scores exemplifying the musical forms.
Prerequisite: MUSC251.

MUSC451 Analysis of Music (3 Credits)
A course in the analysis of music. Discussion of individual works, with emphasis on their unique characteristics and on the relation of analysis to performance.
Prerequisite: MUSC450; or permission of instructor.

MUSC453 Jazz Improvisation I (3 Credits)
Jazz theory, notational conventions, improvisation techniques, reading and analysis of music, and performance in small combo format.
Prerequisite: MUSC251; or students who have taken courses with comparable content may contact the department. And permission of ARHU-School of Music department.
Credit Only Granted for: MUSC345 or MUSC453.
Formerly: MUSC345.

MUSC454 Jazz Improvisation II (3 Credits)
Continuation of MUSC453 including scoring and transcription.
Prerequisite: MUSC453; or students who have taken courses with comparable content may contact the department. And permission of ARHU-School of Music department.
Credit Only Granted for: MUSC346 or MUSC454.
Formerly: MUSC346.

MUSC455 Theory of Jazz (3 Credits)
Analysis of jazz harmony, with emphasis on principles of substitution, reharmonization, and syntax. Topics may also include chord/scale relationships, phrasing and articulation, notation, and introductory arranging concepts such as orchestration and form.
Prerequisite: MUSC250; or permission of ARHU-School of Music department.
Restriction: Must be in a major within ARHU-School of Music department.

MUSC456 Jazz Arranging (3 Credits)
A comprehensive approach to jazz arranging. Topics to include chord scale theory, voicing techniques, part and score layout, and formal construction of an arrangement.
Prerequisite: MUSC455; and permission of ARHU-School of Music department.
Credit Only Granted for: MUSC448N or MUSC456.
Formerly: MUSC448N.

MUSC460 Tonal Counterpoint I (3 Credits)
A course in Eighteenth-Century contrapuntal techniques, analysis and original composition of two-voice dances, preludes, and inventions. Includes an introduction to the study of fugue and canon.
Prerequisite: MUSC251; or permission of ARHU-School of Music department.

MUSC461 Theory and Analysis of Atonal and Twelve-tone Music (3 Credits)
An advanced technical introduction to theory and analysis of atonal and twelve-tone music, with an emphasis on music by Schoenberg, Webern, Bartok, and Stravinsky.
Prerequisite: MUSC251 and MUSC450; and permission of ARHU-School of Music department.
Restriction: Must be in Music Theory and Composition program. Jointly offered with MUSC661.
Credit Only Granted for: MUSC46 1 or MUSC661.

MUSC463 Technology and a Career in Music (3 Credits)
A hands-on introduction to technology as it applies to music creation and recording. Digital audio workstations, music notation software, and cloud-based music technology are used to create and manipulate musical examples with an eye toward their practical applications for professional musicians.
Recommended: Ability to read music on a grand staff (treble and bass clef).
Additional Information: No previous experience with technology is required.

MUSC464 The Theories of Heinrich Schenker (3 Credits)
An advanced analysis course in tonal music with specific emphasis on the theories of the early 20th century theorist Heinrich Schenker. Specific analyses of music by Bach, Mozart, Haydn, Beethoven, Chopin, and Brahms.
Prerequisite: MUSC251 and MUSC450; and permission of ARHU-School of Music department.
Restriction: Must not have completed MUSC651.
Credit Only Granted for: MUSC464 or MUSC651.

MUSC467 Piano Pedagogy I (3 Credits)
A study of major pedagogical treatises in music, and an evaluation of pedagogical techniques, materials, and procedures.
Prerequisite: Permission of ARHU-School of Music department.

MUSC468 Piano Pedagogy II (3 Credits)
Application of the studies begun in MUSC467 to the actual lesson situation. Evaluation of results.
Prerequisite: MUSC467; and permission of ARHU-School of Music department.
Repeatable to: 6 credits.

MUSC469 Orchestral Excerpts for String Players (1 Credit)
In-depth study of the orchestral excerpts required for professional orchestra auditions.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: MUSC469, MUSC448B, MUSC448Q, MUSC448V, or MUSC448X.
Formerly: MUSC448B, MUSC448Q, MUSC448V, and MUSC448X.

MUSC470 Harmonic and Contrapuntal Practices of the Twentieth Century (3 Credits)
A theoretical and analytical study of twentieth century materials.
Prerequisite: MUSC251; or students who have taken courses with comparable content may contact the department. And permission of ARHU-School of Music department.

MUSC471 Contemporary Compositional Techniques (3 Credits)
Continuation of MUSC470, with emphasis on the analysis of individual works written since 1945.
Prerequisite: MUSC470; and permission of ARHU-School of Music department.

MUSC481 Music in the Renaissance (3 Credits)
Survey of western music from 1450 to 1600.

MUSC483 Music in the Classic Era (3 Credits)
Survey of western music from 1750 to 1820.

MUSC484 Music in the Romantic Era (3 Credits)
Survey of western music from 1820 to 1900.

MUSC485 Music in the 20th Century (3 Credits)
Survey of western music from 1900 to the present.
Prerequisite: Permission of ARHU-School of Music department.

MUSC486 Orchestration I (3 Credits)
A study of the ranges, musical functions and technical characteristics of the instruments and their color possibilities in various combinations. Practical experience in orchestrating for small and large ensembles.
Prerequisite: MUSC251; and permission of ARHU-School of Music department.

MUSC490 Conducting (2 Credits)
Vocal and instrumental baton techniques.
Prerequisite: MUSC251.

MUSC491 Conducting II (2 Credits)
Baton techniques applied to score reading, rehearsal techniques, tone production, style and interpretation.
Prerequisite: MUSC490; or students who have taken courses with comparable content may contact the department.

MUSC492 Keyboard Music I (3 Credits)
The history and literature of harpsichord and solo piano music from its beginning to the romantic period. Emphasis is placed on those segments of repertory which are encountered in performance and teaching situations at the present time.
Prerequisite: Permission of ARHU-School of Music department.

MUSC493 Keyboard Music II (3 Credits)
The history and literature of harpsichord and solo piano music from the Romantic period to the present. Emphasis is placed on those segments of repertory which are encountered in performance and teaching situations at the present time.
Prerequisite: MUSC492; and permission of ARHU-School of Music department.

MUSC499 Independent Studies (1-3 Credits)
Independent research on a topic chosen in consultation with the instructor, which may culminate in a paper or appropriate project.
Prerequisite: Permission of ARHU-School of Music department.
Additional Information: May be repeated once for credit.

MUSC601 Advanced English Lyric Diction (1 Credit)
Concepts, strategies and techniques for singing operatic, oratorio and song literature in English: stress patterns, linkage, stressed and non stressed vowels, dipthongs, placement of consonants and vowels, and communication of text with emphasis on current performance practices. Use of the International Phonetic Alphabet (IPA) will be stressed.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) . And permission of instructor; or admission to graduate voice program.

MUSC602 Advanced Italian Lyric Diction (1 Credit)
Concepts, strategies and techniques for singing operatic and song literature in Italian: syllabification, vowels, stressed and unstressed syllables, dipthongs, glides and elisions, single and double consonants with emphasis on current performance practices.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) . And permission of instructor; or admission to graduate voice program.

MUSC603 Advanced German Lyric Diction (1 Credit)
Concepts, strategies and techniques for singing operatic and song literature in German: single and double consonants, the use of the glottal, the German closed (e) and (o) vowels, the "schwa" and consonant clusters. Mastery of the International Phonetic Alphabet (IPA) as it applies to "Hochdeutsch" will be expected.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) . And permission of instructor; or admission to graduate voice program.

MUSC604 Advanced French Lyric Diction (1 Credit)
Concepts, strategies and techniques for singing operatic and song literature in French: phoneticization, formation and singing of the vowel-sounds, semi-consonants, and consonants; the liaison; legato singing in French; the hiatus, mute and aspirate 'h'; stress and word rhythm. Use of the International Phonetic Alphabet (IPA) will be stressed.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) . And permission of instructor; or admission to graduate voice program.

MUSC605 Opera Repertory I (1 Credit)
Advanced vocal coaching of selections from the Italian, French, German, and English opera repertory: musical accuracy; language facility; diction clarity; and dramatic interpretation.
Prerequisite: MUSC602; or permission of instructor.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)).

MUSC606 Opera Repertory II (1 Credit)
Continuation of MUSC 605. Advanced vocal coaching of selections from the Italian, French, German and English opera repertory: musical accuracy, language facility; diction clarity; and dramatic interpretation.
Prerequisite: MUSC605; or permission of instructor.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)).

MUSC608 Chamber Music Repertory (1-3 Credits)
Prerequisite: graduate standing as a major in performance. A study, through performance, of diversified chamber music for standard media.
Repeatable to: 99 credits.
Additional Information: May be repeated for credit to the maximum credit designated in the student's major degree program.

MUSC609 Piano Chamber Music Practicum and Analysis (2 Credits)
Study of repertoire written for piano in duos or with several instruments, to develop an accompanists advanced performance skills in listening, balance, nuance in dynamics, harmonic motion and phrasing.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 4 credits.

MUSC610 Research Methods, Bibliography, and Guided Writings (3 Credits)
Survey of bibliographic material in ethnomusicology. Guided writing utilizing specific bibliography.

MUSC611 Opera Techniques I (2 Credits)
Techniques for opera performance: Improvisation; Acting I, Scene Study I; and Movement I. Practical application of styles and techniques to operatic repertoire.
Corequisite: MUSC601.
Restriction: Permission of director of opera; and must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)).

MUSC612 Opera Techniques II (2 Credits)
Continuation of MUSC 611. Techniques for opera performance: Scene Study II; Movement II; and Mask.
Prerequisite: Minimum grade of B- in MUSC611.
Corequisite: MUSC602.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) ; and permission of Director of Opera required.

MUSC613 Opera Techniques III (2 Credits)
Continuation of MUSC 612. Techniques for opera performance: Scene Study III; Movement III; and Shakespeare.
Prerequisite: Minimum grade of B- in MUSC612; and permission of Director of Opera required.
Corequisite: MUSC603 and MUSC605.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)).

MUSC614 Opera Techniques IV (2 Credits)
Continuation of MUSC 613. Techniques for opera performance: Scene Study IV and Movement IV.
Prerequisite: Minimum grade of B- in MUSC613.
Corequisite: MUSC606 and MUSC604.
Restriction: Must be in one of the following programs (Music - Doctoral (Doctoral); Music - Master (Master's)) ; and permission of Director of Opera required.

MUSC620 Analysis of World Music (3 Credits)
Development of skills for auditory analysis of diverse musical systems.
Recommended: Completion of a seminar in transcription.

MUSC629 Ensemble (1 Credit)
Rehearsal and performance of selected works for small and large instrumental ensembles.
Repeatable to: 36 credits.

MUSC631 Seminar in Organology (3 Credits)
Advanced study of musical instruments of the world, their morphology, musical and cultural function.
Restriction: Permission of ARHU-School of Music department.

MUSC632 The Anthropology of Music (3 Credits)
Explores how leading theoretical paradigms in socio-cultural anthropology have been incorporated into and shaped ethnomusicological research.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUET650 or MUSC632.
Formerly: MUET650.

MUSC633 Field Methods in Ethnomusicology (3 Credits)
Introduction to ethnographic theory and fieldwork methods (participant observation, interviewing, etc.) in ethnomusicology. Students develop and carry out their own fieldwork projects as part of the course.
Restriction: Permission of ARHU-School of Music department.

MUSC634 Field Methods in Ethnomusicology II (3 Credits)
Advanced training in field research techniques and issues including multimedia recording and data management, interview and survey techniques, grant writing, and research ethics.
Prerequisite: MUSC660.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUET661 or MUSC634.
Formerly: MUET661.

MUSC636 Field Methods in Ethnomusicology III (3 Credits)
Continuation of Field Methods in Ethnomusicology II. Further development of skills in data collection and interpretation, culminating in an urban musical ethnography project and document.
Prerequisite: MUSC634.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUET662 or MUSC636.
Formerly: MUET662.

MUSC639 Seminar in Music (3 Credits)
The work of one major composer (Bach, Beethoven, etc.) will be studied.
Prerequisite: MUSC330 and MUSC331.
Restriction: Permission of instructor.
Repeatable to: 99 credits if content differs.

MUSC642 Early Music Notation (3 Credits)
Aspects of notation in music before 1600; transcription into modern notation.

MUSC643 Seminar in Solo Vocal Literature I (3 Credits)
An intensive study of solo vocal literature from its origin to the present.
Prerequisite: MUSC443; or students who have taken courses with comparable content may contact the department.

MUSC644 Seminar in Solo Vocal Literature II (3 Credits)
A continuation of MUSC 643 with an emphasis on areas of individual interest.
Prerequisite: MUSC643; or students who have taken courses with comparable content may contact the department.

MUSC645 Seminar in Vocal Pedagogy (3 Credits)
A study of the physiological, psychological and acoustical aspects of the teaching of singing combined with independent study and research in areas of individual interest.
Prerequisite: MUSC400; or students who have taken courses with comparable content may contact the department.

MUSC646 Introduction to Musicology (3 Credits)
An introduction to the basics of musicological research, including sources, methodologies, and techniques, as well as the fundamentals of both academic and non-academic writing.
Prerequisite: Graduate student standing in in the School of Music.
Credit Only Granted for: MUSC648 or MUSC646.

MUSC648 Seminar in Music Research (3 Credits)
An introduction to graduate study in the history and literature of music. Bibliography and methodology of systematic and historical musicology.
Prerequisite: MUSC331.

MUSC649 Ensemble (1 Credit)
Repeatable to: 36 credits if content differs.

MUSC651 The Theories of Heinrich Schenker (3 Credits)
The analytical methods of Heinrich Schenker with application of those theories to musical literature from the Baroque, Classical and Romantic periods.
Prerequisite: MUSC450; or permission of ARHU-School of Music department.

MUSC653 Jazz Improvisation I (3 Credits)
Study of improvisational techniques and historical styles of jazz, including study of jazz "language" through transcription and analysis of recorded solos, and the exploration of creative processes and philosophical concepts.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC653 or MUSC699Z.
Formerly: MUSC699Z.

MUSC654 Jazz Improvisation II (3 Credits)
Continuation of MUSC653, study of jazz improvisation techniques through analysis, transcription and composition.
Prerequisite: MUSC653.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC654 or MUSC699Z.
Formerly: MUSC699Z.

MUSC655 Theory of Jazz (3 Credits)
Analysis of jazz harmony, with emphasis on principles of substitution, reharmonization, and syntax. Topics may also include chord/scale relationships, phrasing, articulation, notation and orchestration.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC655 ir MUSC699J.
Formerly: MUSC699J.

MUSC656 Jazz Arranging (3 Credits)
Comprehensive approach to jazz arranging, including chord scale theory, voicing techniques, part and score layout, and formal construction of an arrangement.
Prerequisite: MUSC655.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC656 or MUSC699N.
Formerly: MUSC699N.

MUSC658 Seminar in Advanced Analysis (3 Credits)
Individual analytical projects including computer music, non-western music and advanced Schenkerian analysis. Readings regarding form, structure and analytical methods.
Prerequisite: MUSC651, MUSC451, and MUSC471; or permission of ARHU-School of Music department.
Repeatable to: 6 credits if content differs.

MUSC659 Seminar in Repertoire and Pedagogy (2-3 Credits)
Analysis and preparation of choral master works from all major style periods for the purpose of successful rehearsal and performance by conductors.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC659 or MUSC699R.
Formerly: MUSC699R.

MUSC660 String Pedagogy (3 Credits)
A study of major string pedagogical treatises, and an evaluation of string pedagogical techniques, materials, and procedures.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC400S or MUSC660.

MUSC661 Theory and Analysis of Atonal and Twelve-Tone Music (3 Credits)
An introduction to the advanced theoretical literature in atonal and twelve-tone music with an emphasis on analytical applications to music by prominent 20th-century composers.
Prerequisite: MUSC450; or permission of ARHU-School of Music department. Jointly offered with MUSC461.
Credit Only Granted for: MUSC461 or MUSC661.

MUSC665 Theory in Analysis (3 Credits)
An advanced study of the philosophy, practice, and aesthetics of music analysis in contemporary music thoery. Readings drawn from the theoretic literature from 1960 to the present emphasize standards for discourse, the objects of music analysis, rationales for interpretation, and the role that theories of musical structure play in analytic practice.
Prerequisite: MUSC445; or permission of ARHU-School of Music department.
Restriction: Must not have completed MUSC465.
Credit Only Granted for: MUSC465, MUSC665, or MUSC699T.
Formerly: MUSC699T.

MUSC669 Orchestral Excerpts for String Players (1 Credit)
In-depth study of the orchestral excerpts required for professional orchestra auditions.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 6 credits.
Credit Only Granted for: MUSC669, MUSC699B, MUSC699L, MUSC699Q, or MUSC699X.
Formerly: MUSC699B,MUSC699L,MUSC699Q,and MUSC699X.

MUSC670 Advanced Analytical Techniques I (3 Credits)
Analysis of representative masterpieces of the eighteenth and early nineteenth centuries.
Prerequisite: MUSC451; or permission of ARHU-School of Music department.

MUSC671 Advanced Analytical Techniques II (3 Credits)
Analysis of representative masterpieces of the nineteenth and early twentieth centuries.
Prerequisite: MUSC451; or permission of ARHU-School of Music department.

MUSC672 Masterworks of the 20th Century: 1900-1950 (3 Credits)
A comprehensive survey of Western Art-Music of the first half of the 20th Century with a more intensive study and analysis of composers who have had a profound influence in the development of compositional practice in the modern era.
Restriction: Permission of ARHU-School of Music department; and must not have completed MUSC470.
Credit Only Granted for: MUSC448M, MUSC470, MUSC672, or MUSC699M.
Formerly: MUSC699M.

MUSC673 Style Analysis (3 Credits)
An analytical study of musical style from the Middle Ages to present through analysis of selected compositions. The principle genres and composers of Medieval, Renaissance, Baroque, Classical, Romantic and 20th century music will be covered.
Prerequisite: MUSC251; and permission of ARHU-School of Music department.
Restriction: Must not have completed MUSC448.
Credit Only Granted for: MUSC673, MUSC448F, or MUSC699F.
Formerly: MUSC699F.

MUSC675 Music Theory Pedagogy (3 Credits)
Analysis of introductory level music theory courses, evaluation of text materials, and teaching approaches for music fundamentals, aural training, and basic undergraduate theory programs.

MUSC676 Historical Theory and Method in Ethnomusicology (3 Credits)
Reading and discussion of major works in ethnomusicology, with emphasis on schools of thought, convergence with and divergence from musicology and systematic musicology; close examination of trends in methodology and theory from the mid-eighteenth century until approximately thirty years before the present.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUET675 or MUSC676.
Formerly: MUET675.

MUSC677 Introduction to Ethnomusicology (3 Credits)
An introduction to the field of ethnomusicology: its origins as comparative musicology, its establishment as an autonomous discipline, and its contemporary trajectories.
Restriction: Permission of ARHU-School of Music department.

MUSC678 Seminar in Musical Composition (3 Credits)
An advanced course in musical composition. May be repeated for credit.

MUSC679 Seminar in Ethnomusicology (3 Credits)
Seminar topics address current issues, including gender, the social economy of music, ethnography of performance, etc.
Repeatable to: 9 credits if content differs.
Formerly: MUET679.

MUSC680 Seminar in Music of Antiquity and the Middle Ages (3 Credits)
Research topics in music from antiquity to 1450.

MUSC682 Seminar in Music of the Baroque Era (3 Credits)
Seminar in music of the Baroque era. Research topics in music from 1600 to 1750.

MUSC683 Seminar in Music of the Classic Era (3 Credits)
Seminar in music of the Classic era. Research topics in music from 1750 to 1820.

MUSC684 Seminar in Music of the Romantic Era (3 Credits)
Seminar in music of the Romantic era. Research topics in music from 1820 to 1900.

MUSC685 Seminar in Music of the 20th Century (3 Credits)
Seminar in music of the twentieth century. Research topics in music from 1900 to the present.

MUSC688 Advanced Orchestration (3 Credits)
Orchestration projects in the styles of Debussy, Ravel, Stravinsky, Schoenberg, Bartok, and others.
Prerequisite: MUSC487; or students who have taken courses with comparable content may contact the department.
Additional Information: May be repeated once for credit.

MUSC689 Advanced Conducting (2 Credits)
A concentrated study of the conducting techniques involved in the repertoire of all historical periods.
Prerequisite: MUSC491; or students who have taken courses with comparable content may contact the department.
Additional Information: May be repeated for credit with permission of instructor.

MUSC698 Advanced Seminar in Ethnomusicology (3 Credits)
Advanced Seminar on topics that change every semester. Requires well-developed skills in musical and social analysis, mastery of theories and methods of ethnomusicology.
Prerequisite: Permission of ARHU-School of Music department.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: MUET689 or MUSC698.
Formerly: MUET689.

MUSC699 Selected Topics in Music (1-3 Credits)
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 6 credits if content differs.

MUSC757 Aural Skills for Conductors (1 Credit)
Advanced musicianship skills necessary for conductors.
Restriction: Permission of ARHU-School of Music department.

MUSC758 Advanced Aural Skills for Conductors (1 Credit)
Continuation of MUSC757, advanced aural skills necessary for conductors.
Prerequisite: MUSC757.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 4 credits.

MUSC799 Master's Thesis Research (1-6 Credits)

MUSC800 Advanced Seminar in Music Pedagogy (3 Credits)
A detailed study of historical and contemporary methods of pedagogy, and analysis of pedagogical problems. Sectioning by instrument. Required of all candidates for the D.M.A. Degree in performance and literature.
Prerequisite: MUSC400; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.

MUSC801 Advanced Seminar in Music Pedagogy (3 Credits)
A detailed study of historical and contemporary methods of pedagogy, and analysis of pedagogical problems. Sectioning by instrument. Required of all candidates for the D.M.A. Degree in performance and literature.
Prerequisite: MUSC400; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.

MUSC802 Advanced Seminar in Music Pedagogy III (3 Credits)
A detailed study of historical and contemporary methods of pedagogy, and analysis of pedagogical problems. Sectioning by instrument.
Prerequisite: MUSC801.
Restriction: Permission of ARHU-School of Music department.

MUSC811 Doctoral Opera Techniques (2 Credits)
Techniques for opera performance: Improvisation; Acting I, Scene Study I; and Movement I. Practical application of styles, techniques to operat e repertoire, and methodology seminar.
Restriction: Permission of ARHU-School of Music department.
Credit Only Granted for: MUSC611 or MUSC811.

MUSC812 Doctoral Opera Techniques II (2 Credits)
Continuation of MUSC811. Techniques for opera preformance: Scene Study II; Acting II; Movement II: Stage Combat I; and Mask; and methodology seminar.
Prerequisite: MUSC811; and permission of ARHU-School of Music department.
Credit Only Granted for: MUSC612 or MUSC812.

MUSC813 Doctoral Opera Techniques III (2 Credits)
Continuation of MUSC812. Techniques for opera performance: Scene Study III; Movement III; Acting III Shakespeare; Dance I; Stage Combat II; Stage Combat II; and methodology seminar.
Prerequisite: MUSC812; and permission of ARHU-School of Music department.
Credit Only Granted for: MUSC613 and MUSC813.

MUSC814 Doctoral Opera Techniques IV (2 Credits)
Continuation of MUSC813. Techniques for opera performance: Scene Study IV; Dance II; Movement IV; and methodology seminar.
Prerequisite: MUSC813; and permission of ARHU-School of Music department.
Credit Only Granted for: MUSC614 or MUSC814.

MUSC830 Doctoral Seminar in Music Literature (3 Credits)
An analytical survey of the literature of music: keyboard music; vocal music; string music; wind instrument music; required of all candidates for the D.M.A. Degree in literature-performance.
Prerequisite: Must have completed at least twelve hours in music history and literature.

MUSC831 Doctoral Seminar in Music Literature (3 Credits)
An analytical survey of the literature of music: keyboard music; vocal music; string music; wind instrument music. Required of all candidates for the D.M.A. Degree in literature-performance.
Prerequisite: MUSC830; or permission of ARHU-School of Music department.

MUSC832 Doctoral Seminar in Music Literature (3 Credits)
An analytical survey of the literature of music: keyboard music; vocal music; string music; wind instrument music.
Prerequisite: MUSC831.
Restriction: Permission of ARHU-School of Music department.

MUSC878 Advanced Composition (3 Credits)
Conference course in composition in the larger forms.
Prerequisite: MUSC678; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.
Repeatable to: 99 credits.

MUSC898 Pre-Candidacy Research (1-8 Credits)

MUSC899 Doctoral Dissertation Research (1-8 Credits)

MUSP - Music Performance

MUSP402 Music Performance (2 Credits)
Senior course, in the minor series.

MUSP403 Music Performance (2 Credits)
Senior course, in the minor series.

MUSP609 Interpretation and Repertoire (2 Credits)
Restriction: Permission of ARHU-School of Music department; and must have graduate standing in performance in the principal series.

MUSP610 Graduate Music Performance (4 Credits)
Prerequisite: MUSP609.
Restriction: Permission of ARHU-School of Music department.

MUSP619 Interpretation and Repertoire (2-4 Credits)
Prerequisite: departmental audition and permission of Department Chairman. Repeatable to a maximum of 12 credits.
Restriction: Must complete a Departmental audition; and permission of ARHU-School of Music department.

MUSP620 Graduate Music Performance (4 Credits)
Prerequisite: MUSP 619 and permission of Department Chairman. Recital course in the major series.
Prerequisite: MUSP619.
Restriction: Permission of ARHU-School of Music department.

MUSP621 Interpretation, Repertoire, and Performance (2-4 Credits)
Private music instruction in preparation for public performance.
Prerequisite: MUSP619.
Corequisite: MUSC758.
Restriction: Permission of ARHU-School of Music department.

MUSP679 Practicum (1 Credit)
Private individual instruction on a secondary instrument.
Restriction: Permission of ARHU-School of Music department.
Repeatable to: 4 credits.

MUSP719 Interpretation and Repertoire (2-4 Credits)
Prerequisite: departmental audition, admission to doctoral program in the major series and permission of department chairman. Repeatable to a maximum of 12 credits.
Restriction: Must complete a Departmental audition; and must be in the doctoral program in the major series; and permission of ARHU-School of Music department.

MUSP815 Interpretation, Performance, and Pedagogy (4 Credits)
A seminar in pedagogy and the pedagogical literature for the doctoral performer, with advanced instruction at the instrument, covering appropriate compositions. Required of all candidates for the D.M.A. Degree in literature-performance. Prerequisite: doctoral standing in performance and permission of department chairman. Recital course.
Restriction: Must have Doctoral standing in performance; and permission of ARHU-School of Music department.

MUSP816 Interpretation, Performance, and Pedagogy (4 Credits)
Recital course. Prerequisite: MUSP 815 and permission of Department Chairman.
Prerequisite: MUSP815.
Restriction: Permission of ARHU-School of Music department.

MUSP817 Interpretation, Performance, and Pedagogy (4 Credits)
Recital course. Prerequisite: MUSP 816 and permission of Department Chairman.
Prerequisite: MUSP816.
Restriction: Permission of ARHU-School of Music department.

MUSP898 Pre-Candidacy Research (1-8 Credits)

MUSP899 Doctoral Dissertation Research (1-8 Credits)

NACS - Neuroscience & Cognitive Science

NACS600 Ethics in Scientific Research (2 Credits)
Issues of scientific integrity with emphasis on investigators in the laboratory sciences, including mentoring, scientific record keeping, authorship and peer review, ownership of data, use of animals and humans in research, and conflict of interest.
Prerequisite: Must have completed a year of graduate study.
Restriction: Permission of instructor; and must be in Neurosciences and Cognitive Sciences (Doctoral) program.
Credit Only Granted for: NACS600, PSYC788B, or BIOL600.

NACS608 Neuroscience and Cognitive Science Seminar (1 Credit)
Special seminar topics in Neuroscience and Cognitive Science.
Restriction: Permission of instructor.
Repeatable to: 8 credits if content differs.

NACS640 Foundational Readings Seminar (2 Credits)
An introduction to the breadth of research in Neuroscience and Cognitive Science. Faculty will present papers to provide historical context and introduction to important issues in the fields of their research.
Restriction: Permission of instructor; and must be in Neurosciences and Cognitive Sciences (Doctoral) program.
Credit Only Granted for: NACS640 or NACS728R.
Formerly: NACS728R.

NACS641 Introduction to Neurosciences (4 Credits)
Detailed examination of neurophysiology and sensorimotor systems.
Restriction: Permission of instructor.

NACS642 Cognitive Neuroscience (4 Credits)
A study of the fundamental concepts and techniques of cognitive neuroscience. Hands-on experience with three critically different cognitive neuroscience methods: EEG, MEG, and fMRI.

NACS643 Computational Neuroscience (4 Credits)
Provides a mathematical foundation in computational neuroscience.
Prerequisite: NACS641; and must have completed a course in calculus; and permission of instructor.

NACS644 Cellular and Molecular Neuroscience (4 Credits)
Overview of insights into the molecular mechanisms underlying the structure and function of the nervous system.
Prerequisite: NACS641; or permission of instructor.

NACS645 Cognitive Science (4 Credits)
A study of mental representations and computations. Issues examined include computation, representations, decisions, modularity, evolution, innateness, and reductionism.
Credit Only Granted for: NACS645 or NACS728Y.
Formerly: NACS728Y.

NACS728 Selected Topics in Neuroscience and Cognitive Science (2-4 Credits)
Graduate seminar on selected topics in contemporary neuroscience and Cognitive science. Extensive readings from the primary literature. Topics vary by semester.
Restriction: Permission of BSOS-Dean-Neuroscience and Cognitive Science.
Repeatable to: 15 credits if content differs.

NACS798 Master's Non-Thesis Research (1-3 Credits)
Individual research course for NACS non-thesis MS degree
Restriction: Must be in Neurosciences and Cognitive Sciences (Doctoral) program.
Repeatable to: 6 credits.

NACS799 Master's Thesis Research (1-3 Credits)
Individualized research course for NACS thesis MS degree
Restriction: Must be in Neurosciences and Cognitive Sciences (Doctoral) program.
Repeatable to: 6 credits.

NACS898 Pre-Candidacy Research (1-8 Credits)

NACS899 Doctoral Dissertation Research (1-8 Credits)
Indivdual instruction course: contact department or instructor to obtain section number
Restriction: Must be in Neurosciences and Cognitive Sciences (Doctoral) program.

NAVY - Navy

NAVY400 Naval Operations and Seamanship (3 Credits)
Capstone course for senior NROTC Navy-option midshipmen in advanced navigation, communications, naval operations, and naval warfare. Students learn through simulation in a computer classroom known as the Maritime Skills Simulator (MSS), in addition to lectures, discussions, and qualitative and quantitative tests/examinations. Students will engage in discussions regarding the moral and ethical responsibilities or military leaders, as well as the essential attributes of character required for effective leadership.
Recommended: NAVY201.
Restriction: Permission of UGST-Navy ROTC.
Additional Information: Priority enrollment will be given to students enrolled in the NROTC program.

NAVY401 Leadership and Ethics (3 Credits)
Integrates an intellectual exploration of Western moral traditions and ethical philosophy with military leadership, core values, the Uniform Code of Military Justice, and Navy regulations. The course provides students with a basic understanding of major moral traditions including Relativism, Utilitarianism, Kantian Ethics, Natural Law Theory, Divine Command Theory, and Virtue Ethics.
Recommended: NAVY200.
Restriction: Permission of UGST-Navy ROTC.
Additional Information: Priority enrollment will be given to students enrolled in the NROTC program.

NAVY402 Fundamentals of Maneuver Warfare (3 Credits)
A detailed study of the characteristics of modern warfare and their interactions with maneuver warfare doctrine, with a focus on the United States Marine Corps. Throughout the course, there is a strong focus on leadership, as the fundamental purpose of this course is to develop the skills, knowledge, leadership background and mentality necessary for a successful future leadership and service, whether in the military or the civilian sector.
Recommended: NAVY100, NAVY101, NAVY200, and NAVY108.
Restriction: Permission of UGST-Navy ROTC.
Additional Information: Priority in enrollment will be given to students in the NROTC program.

NFSC - Nutrition and Food Science

NFSC412 Food Processing Technology (4 Credits)
Provides in-depth study of the major industrial modes of food preservation. It integrates aspects of the biology, microbiology, biochemistry and engineering disciplines as they relate to food processing technology and food science.
Prerequisite: CHEM241, CHEM242, NFSC431, NFSC414, and NFSC434.
Corequisite: NFSC421 and NFSC423.
Recommended: MATH120; or completion of MATH220 recommended.

NFSC414 Mechanics of Food Processing (4 Credits)
Applications in the processing and preservation of foods, of power transmission, hydraulics, electricity, thermodynamics, refrigeration, instruments and controls, materials handling and time and motion analysis.
Prerequisite: PHYS121.
Credit Only Granted for: ENBE414 or NFSC414.
Formerly: ENBE414.

NFSC421 Food Chemistry (3 Credits)
Basic chemical and physical concepts are applied to the composition and properties of foods. Emphasis on the relationship of processing technology to the keeping quality, nutritional value, and acceptability of foods.
Prerequisite: BCHM461.

NFSC422 Food Product Research and Development (3 Credits)
A capstone course for FDSC majors. A study of the research and development of new food products. Application of food technology, engineering, safety and packaging are integrated by teams of students to develop a new food product from concept to pilot plant scale-up. Students will travel to nearby food processing plants on two to four Saturdays during the semester.
Restriction: Senior standing; and must be in a major within AGNR-Nutrition and Food Science department; and permission of AGNR-Nutrition and Food Science department.
Formerly: FDSC422.

NFSC423 Food Chemistry Laboratory (3 Credits)
Analysis of the major and minor constituents of food using chemical, physical and instrumental methods in concordance with current food industry and regulatory practices. Laboratory exercises coincide with lecture subjects in NFSC421.
Prerequisite: Must have completed or be concurrently enrolled in NFSC421.

NFSC425 International Nutrition (3 Credits)
Nutritional status of world population; consequences of malnutrition on health and mental development; and local, national, and international programs for nutritional improvement.
Prerequisite: Must have completed one course in basic nutrition.

NFSC430 Food Microbiology (3 Credits)
A study of microorganisms of major importance to the food industry with emphasis on food-borne outbreaks, public health significance, bioprocessing of foods, disease control, and the microbial spoilage of foods.
Prerequisite: BSCI223; or permission of instructor.
Credit Only Granted for: ANSC430 or NFSC430.
Formerly: FDSC430.

NFSC431 Food Quality Control (4 Credits)
Definition and organization of the quality control function in the food industry; preparation of specifications; statistical methods for acceptance sampling; in-plant and processed product inspection. Instrumental and sensory methods for evaluating sensory quality, identity and wholesomeness and their integration into grades and standards of quality. Statistical Process Control (SPC).

NFSC434 Food Microbiology Laboratory (3 Credits)
A study of techniques and procedures used in the microbiological examination of foods.
Prerequisite: Must have completed or be concurrently enrolled in NFSC430.
Credit Only Granted for: NFSC434 or ANSC434.
Formerly: FDSC434.

NFSC440 Advanced Human Nutrition (4 Credits)
A critical study of physiologic, molecular and metabolic influences on utilization of carbohydrates, lipids, proteins, vitamins, macro-and micro-minerals, and nonnutritive components of food. Interactions of these nutrients and food components will be examined relative to maintaining health.
Prerequisite: Minimum of C- in NFSC100, BCHM462 and BSCI440.

NFSC450 Food and Nutrient Analysis (3 Credits)
Methods and practices of the analysis of foods and nutrients. An overview of the principles and basic mechanisms used in many of the analytical procedures commonly used in food and nutrition research. Emphasis will be placed on hands-on development of skills necessary to complete each analytical procedure; and on the accurate and concise description of the methodology and results from their application and on the regulations governing food analysis for nutritional labeling.
Prerequisite: BCHM461 and NFSC100.
Formerly: NUTR450.

NFSC455 Medical Nutrition Therapy I (4 Credits)
Advanced clinical nutrition course for dietetics or nutrition science majors. Modifications of the normal adequate diet to meet human nutritional needs in acute and chronic diseases and metabolic disorders. Includes energy balance and weight management, nutritional genomics, nutrition counseling, autoimmune disease, nutrition for pediatric conditions.
Prerequisite: NFSC380.
Corequisite: NFSC440.

NFSC456 Medical Nutrition Therapy II (4 Credits)
Modifications of the normal adequate diet to meet human nutritional needs in acute and chronic diseases and metabolic disorders.
Prerequisite: Minimum of C- in NFSC380 and NFSC440; and permission of AGNR-Nutrition and Food Science department.

NFSC470 Community Nutrition (3 Credits)
Perspectives underlying the practice of nutrition services in community settings. Assessment of needs, program planning and evaluation. Programs and strategies to meet nutrition needs outside the acute care setting, such as nutrition education and food assistance. National nutrition policy and federal initiatives in nutrition will be examined. Students will be required to travel to local community nutrition sites during the semester.
Prerequisite: Minimum of C- in NFSC315.

NFSC490 Special Problems in Nutrition (2-3 Credits)
Individually selected problems in the area of human nutrition.
Prerequisite: NFSC440; and permission of AGNR-Nutrition and Food Science department.

NFSC491 Professional Issues and Opportunities in Dietetics (3 Credits)
A capstone course for dietetics majors. Students will integrate knowledge and theory of nutrition, food, management, psychology, and social behaviors necessary to support quality dietetic practice. Working in teams, students will participate in case studies, simulated situations and community projects. Individuals and groups will present cases as well as papers on published research.
Prerequisite: Minimum of C- in NFSC350 and permission of Nutrition and Food Science Dietetics program.
Corequisite: NFSC456.
Restriction: Senior standing or higher; and must be in Nutrition and Food Science: Dietetics program.

NFSC498 Selected Topics (1-3 Credits)
Selected current aspects of food.
Restriction: Permission of AGNR-Nutrition and Food Science department.
Repeatable to: 6 credits if content differs.

NFSC605 Food-Related Behavior of the Individual (3 Credits)
Examination of the factors that influence food-related behavior and of the research methods used.
Restriction: Permission of AGNR-Nutrition and Food Science department.
Formerly: FOOD670.

NFSC611 Molecular Nutrition: Genomic, Metabolic, and Health Aspects (2 Credits)
The emerging discipline of molecular nutrition encompasses nutritional biochemistry, nutritional genomics, nutritional metabolomics, and epigenetics. It focuses on the effects of diet and nutrients on an individual's genome and metabolism, and how the molecular events affect human health. This is a co-taught course together with National Taiwan University via videoconferencing.
Recommended: BCHM461, NFSC440, or BCHM463.

NFSC620 Diet and Cancer Prevention (3 Credits)
1. The nature of cancer and the relationship between dietary/nutritional factors and incidence of cancer 2. Basic concepts of general cancer biology with focus on effects of dietary components on genes and their encoded proteins, epigenetic changes and cell signaling 3. Effect of dietary factors in various types of cancer with respect to the benefit of intervention strategies for chemoprevention 4. Scientific knowledge, critical thinking, and the practical application of diet in cancer prevention.
Prerequisite: NFSC440; or permission of instructor.
Credit Only Granted for: NFSC620 or NFSC679D.
Formerly: NFSC678D.

NFSC630 Nutritional Aspects of Energy Balance (3 Credits)
The prevalence and basic causes of caloric imbalance, along with a wide variety of approaches to weight control.
Formerly: NUTR630.

NFSC631 Advanced Food Microbiology (3 Credits)
One lecture and one laboratory period a week. An in-depth understanding and working knowledge of a selected number of problem areas and contemporary topics in food microbiology.
Prerequisite: NFSC430.
Restriction: Permission of instructor.

NFSC633 Food Polymer Science (3 Credits)
Food polymers including protein and carbohydrate from food, and their chemical, physical, and functional properties together with their structure-function relationship will be discussed. Food polymer applications in food and non-food areas will be covered. Principles and applications of instrumental methods for polymer characterization will be introduced. An emphasis on nanotechnology and its application to design and characterization food polymers will be included.
Prerequisite: Permission of instructor.
Credit Only Granted for: NFSC633 or NFSC679P.
Formerly: NFSC679P.

NFSC650 Nutrition and Public Health (2 Credits)
Overview of the major policy debates involving nutrition and health in the U.S. Public Health System associated with nutrition, chronic disease and nutrition lifestyle stages will be discussed. The CDCynergy software program will facilitate the development of program design, implementation and evaluation skills.
Prerequisite: NFSC470.
Restriction: Permission of AGNR-Nutrition and Food Science department.

NFSC655 Nutrition, Food and Public Policy (3 Credits)
History and current status of legislation relative to nutrition and food. Focus on gaining insights and skills regarding working effectively in the area of nutrition and policy.
Formerly: NUTR655.

NFSC660 Research Methods (3 Credits)
A study of appropriate research methodology and theories including experimental design. Each student is required to develop a specimen research proposal.
Prerequisite: Must have completed one statistics course.
Formerly: NUTR 660.

NFSC675 Nutritional Epidemiology (3 Credits)
Discussion of definition, history, relevance, and application of nutritional epidemiology to national and international nutrition problems. Exposure to skills and methodological tools used in nutritional epidemiology. Practical examples of epidemiologic studies also performed.
Prerequisite: NFSC440.
Corequisite: BIOM602.
Formerly: NUTR675.

NFSC678 Selected Topics in Nutrition (1-6 Credits)
Individual or group study in an area of nutrition.
Repeatable to: 6 credits.
Formerly: NUTR678.

NFSC679 Selected Topics in Food Science (1-6 Credits)
Individual or group study in an area of food science.
Repeatable to: 6 credits if content differs.

NFSC680 Human Nutritional Status (3 Credits)
Indirect and direct methods of appraisal of human nutritional status which include: dietary, anthropometric, clinical evaluations and biochemical measures.
Prerequisite: Must have complete coursework in advanced nutrition, biochemistry and physiology.

NFSC688 Seminar in Nutrition and Food Science (1-3 Credits)
This is a seminar course presentedy by NFSC graduate students and invited speakers in the field of nutrition and food science.
Restriction: Must be in a major within AGNR-Nutrition and Food Science department.
Repeatable to: 3 credits.
Formerly: NUTR688.

NFSC690 Nutrition and Aging (3 Credits)
Examine the physiological, social and psychological changes that may occur with aging and their impact on nutritional status and on successful aging.
Prerequisite: NFSC440 or BSCI440; or students who have taken courses with comparable content may contact the department.

NFSC698 Colloquium in Food Science (1 Credit)
Oral reports on special topics or recently published research in food science and technology. Distinguished scientists are invited as guest lecturers. A maximum of three credits allowed for the M.S.
Formerly: FDSC698.

NFSC699 Problems in Nutrition and Food Science (1-4 Credits)
Credit according to time scheduled and magnitude of problem. An experimental program on a topic other than the student's thesis problem will be conducted. Four credits shall be the maximum allowed toward an advanced degree.
Restriction: Permission of AGNR-Nutrition and Food Science department.
Formerly: FDSC 699 and NUTR 699.

NFSC735 Food Toxicology (3 Credits)
An introduction to basic concepts in toxicology in relation to toxic food contaminants and additives; both synthetic and naturally occurring. Focus on exposure routes, molecular targets and susceptible individuals. Also includes regulatory toxicology with respect food toxins.
Recommended: BCHM462, BSCI440, or CHEM131. Cross-listed with MIEH735.
Credit Only Granted for: MIEH735 or NFSC735.

NFSC799 Master's Thesis Research (1-6 Credits)
First and second semesters. Credit in proportion to work done and results accomplished. Investigation in some phases of foodservice administration which may form the basis of a thesis. results in the form of a thesis.
Formerly: FDSC 799, NUSC 799, and NUTR 799.

NFSC898 Pre-Candidacy Research (1-8 Credits)
First and second semesters. Oral reports on special topics or recently published research in nutrition. Distinguished scientists are invited as guest lecturers. A maximum of three credits allowed for the M.S.
Formerly: NUSC898.

NFSC899 Doctoral Dissertation Research (1-8 Credits)
Formerly: FDSC 899, NUSC 899, and NUTR 899.

PERS - Persian

PERS402 Persian Translation (3 Credits)
Focuses on hands-on practice of English/Persian and Persian/English translation as well as the problematic issues of translation. Taught in Persian.
Prerequisite: PERS302; or permission of ARHU-School of Languages, Literatures, and Cultures department.

PERS405 Media and the Current Issues in Iranian Society (6 Credits)
Develops Persian language proficiency and domain-specific knowledge at advanced-mid to advanced-high level on ACTFL scale. Enhances linguistic and cultural competence. Provides a broad understanding of some of the current social, political and economic issues in modern Iran. Taught in Persian.
Prerequisite: PERS306; or equivalent as determined by FLPT (Foreign Language Placement Test).

PERS406 Practicum in Persian Translation (6 Credits)
Provides opportunities for translation, interpretation, and analysis of various authentic oral and written texts (both English to Persian and Persian to English). Facilitates the development of Persian language proficiency at advanced level through a task-based approach that integrates all the language skills in pedagogical translation activities.
Prerequisite: PERS306; or equivalent as determined by the FLPT (Foreign Language Placement Test).

PERS498 Special Topics in Persian Studies (3 Credits)
Topic and language to be announced when offered.
Prerequisite: Permission of instructor.
Repeatable to: 9 credits if content differs.

PERS601 Modern Persian Literature (3 Credits)
Selected readings in Persian poetry, fiction and drama covering topics related to contemporary Iranian society and culture. In Persian.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.

PERS662 Persian Sociolinguistics (3 Credits)
Study of impact of social and regional factors on spoken and written usage. In Persian.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.

PERS689 Special Topics in Persian Studies (3 Credits)
In-depth analysis of a particular aspect of Persian studies. In Persian.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 12 credits if content differs.

PHIL - Philosophy

PHIL408 Topics in Contemporary Philosophy (3 Credits)
An intensive examination of contemporary problems and issues. Source material will be selected from recent books and articles.
Repeatable to: 99 credits if content differs.

PHIL409 Advanced Studies in Contemporary Philosophy (3 Credits)
An in-depth study of a contemporary philosophical problem or issue. Topics will vary, but the course will encourage students to grapple with the primary literature in order to generate sustained critical analyses or proposed resolutions of issues under active consideration in contemporary philosophy.
Prerequisite: 6 credits in PHIL courses.
Repeatable to: 12 credits if content differs.

PHIL412 The Philosophy of Plato (3 Credits)
A critical study of selected dialogues.
Prerequisite: 6 credits in PHIL courses.

PHIL414 The Philosophy of Aristotle (3 Credits)
A critical study of selected portions of Aristotle's writings.
Prerequisite: 6 credits in PHIL courses.

PHIL417 The Golden Age of Jewish Philosophy (3 Credits)
Jewish philosophy from Maimonides in the 12th century to the expulsion of the Jews from Spain at the end of the 15th century. Topics include the limitations of human knowledge, creation of the world, foreknowledge and free will, and the existence of God.
Prerequisite: 3 credits in PHIL courses; or permission of ARHU-Meyerhoff Program & Center for Jewish Studies; or permission of ARHU-Philosophy department. Cross-listed with JWST452.
Credit Only Granted for: JWST452 or PHIL417.

PHIL418 Topics in Epistemology/Metaphysics (3 Credits)
An intensive examination of contemporary problems and issues in epistemology or metaphysics. Source material will be selected from recent books and articles.
Prerequisite: 2 courses in PHIL.
Repeatable to: 12 credits if content differs.

PHIL428 Topics in the History of Philosophy (3 Credits)
Prerequisite: PHIL310 and PHIL320; or permission of ARHU-Philosophy department.
Repeatable to: 99 credits if content differs.

PHIL438 Topics in Value Theory (3 Credits)
An intensive examination of contemporary problems and issues in ethics, aesthetics, political philosophy and related areas. Source material will be selected from recent books and articles.
Prerequisite: 2 courses in PHIL.
Repeatable to: 12 credits if content differs.

PHIL443 Moral Psychology (3 Credits)
Philosophers often stress reasoning as the appropriate source for practical and moral action. Would a realistic view of human psychology undermine this assumption? This course will examine recent philosophical and empirical work on the relevance of emotion and/or intuition to rationality, moral worth, and moral judgment.
Prerequisite: 2 courses in PHIL.
Recommended: PHIL341 is strongly recommended for background on the historical authors that the readings make reference to.
Credit Only Granted for: PHIL408P or PHIL443.
Formerly: PHIL408P.

PHIL445 Contemporary Political Philosophy (3 Credits)
Major trends in contemporary political philosophy: liberal, libertarian, communitarian, socialist, feminist.
Restriction: Must have completed 3 credits in philosophy or political theory; or permission of ARHU-Philosophy department. And sophomore standing or higher.

PHIL446 Law, Morality, and War (3 Credits)
An exploration of fundamental moral and legal issues concerning war.
Prerequisite: GVPT401 and PHIL341; or permission of ARHU-Philosophy department.

PHIL453 Philosophy of Science II (3 Credits)
A comprehensive survey of developments in the main problems of the philosophy of science from logical positivism to the present. The nature of theories, models, laws, and counterfactuals, testing, inductive logic, and confirmation theory, experimental methodology, measurement, explanation, concept formation, growth of scientific knowledge, and scientific realism.
Prerequisite: Students must have completed a minium of two philosophy courses.

PHIL454 Philosophy of Space and Time (3 Credits)
A non-technical investigation of philosophical issues in the foundations of physics. Topics may include traditional philosophical problems of space and time, metaphysical issues about the nature of particles and fields, and philosophical problems associated with the introduction of probability into physics, such as the problem of irreversibility in thermodynamics and the problem of objectivity in quantum theory.
Prerequisite: 6 credits in PHIL courses.

PHIL458 Topics in the Philosophy of Science (3 Credits)
A detailed examination of a particular topic or problem in philosophy of science.
Repeatable to: 6 credits if content differs.

PHIL469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

PHIL470 Logical Theory II: Incompleteness and Undecidability (3 Credits)
Introduces the formal theory of computation, and then presents the the central limitative results of modern first-order logic: Church's undecidability theorem and Godel's first and second incompleteness theorems. The primary focus of the course is a thorough technical study of these fundamental results, but we will also discuss some of the philosophical issues they raise. Further topics may include second-order logic.
Prerequisite: PHIL370; or permission of instructor.

PHIL478 Topics in Philosophical Logic (3 Credits)
Philosophical logics result from the application of formal techniques to problems of philosophical interest; these logics often have applications in other areas as well, such as AI, linguistics, psychology, economics, and law. This course will either concentrate on a particular family of philosophical logics (such as modal or temporal or defeasible logics) or else survey a number different logical systems.
Prerequisite: PHIL271; or permission of instructor.
Recommended: PHIL470.
Repeatable to: 9 credits if content differs.

PHIL488 Topics in Philosophy of Cognitive Studies (3 Credits)
Examination of a particular topic or problem in philosophy of cognitive studies.
Prerequisite: 3 credits in PHIL courses; or permission of ARHU-Philosophy department.
Repeatable to: 9 credits if content differs.

PHIL489 Undergraduate Seminar in Philosophy (3-6 Credits)
An intensive examination of a philosophical topic or topics.
Restriction: Permission of ARHU-Philosophy department.
Repeatable to: 6 credits if content differs.

PHIL490 The Practice of Philosophy: How To Develop Your Own Work (3 Credits)
Writing philosophical papers, presenting them to an audience, and responding critically and constructively to the papers and talks of others are skills central to the practice of philosophy. This course will help students to enhance those skills in a seminar-style format. Students should come to the course with a paper of their own (likely from another course) that they would like to develop.
Prerequisite: Three upper-level (300- or 400-level) courses in philosophy or permission of the instructor.
Credit Only Granted for: PHIL408R or PHIL490.
Formerly: PHIL408R.

PHIL498 Topical Investigations (1-3 Credits)

PHIL640 Value Theory (3 Credits)
A basic course in value theory for beginning graduate students, covering a number of topics in depth, to provide a springboard for further study and research in the area.

PHIL660 Metaphysics, Mind, and Language (3 Credits)
A basic course on selected issues in metaphysics, philosophy of mind, and philosophy of language for beginning graduate students, covering a number of topics in depth, to provide a springboard for further study and research in the area.

PHIL688 Selected Problems in Philosophy (1-3 Credits)
Restriction: Permission of instructor.

PHIL788 Research in Philosophy (1-6 Credits)
Prerequisite: Permission of advisor or chair of tutorial-advisory committee required.
Repeatable to: 6 credits.

PHIL798 Master's Level Independent Study (1-3 Credits)
Master's level independent study.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

PHIL799 Master's Thesis Research (1-6 Credits)

PHIL808 Seminar in the Problems of Philosophy (3 Credits)
Restriction: Permission of instructor.

PHIL828 Seminar in the History of Philosophy (3 Credits)
Restriction: Permission of instructor.

PHIL838 Seminar in Aesthetics (3 Credits)
Restriction: Permission of instructor.

PHIL848 Seminar in Ethics (3 Credits)
Restriction: Permission of instructor.

PHIL858 Seminar in Logic and Philosophy of Sciences (3 Credits)
Restriction: Permission of instructor.

PHIL859 Proseminar in the Philosophy of Science (3 Credits)
Seminar on the core areas of research in philosophy of science, with the focus on a theme currently generating attention in the field.
Restriction: Permission of instructor.
Repeatable to: 9 credits if content differs.

PHIL868 Seminar in Metaphysics (3 Credits)
Restriction: Permission of instructor.

PHIL869 Seminar in the Theory of Knowledge (3 Credits)
Restriction: Permission of instructor.

PHIL878 Seminar in Cognitive Studies (3-9 Credits)
Methodology and research in various disciplines involved in cognitive studies.
Restriction: Permission of ARHU-Philosophy department.
Repeatable to: 9 credits if content differs.

PHIL879 Seminar in Philosophy and Cognitive Studies (3 Credits)
Repeatable to: 9 credits if content differs.

PHIL888 Professional Mentoring for Doctoral Students (1-3 Credits)
Work with a faculty advisor on various aspects of professional development.
Restriction: Permission of ARHU-Philosophy department.
Repeatable to: 3 credits if content differs.

PHIL889 Pedagogical Mentoring for Doctoral Students (1-3 Credits)
Work with a faculty advisor to develop and improve pedagogical skills.
Restriction: Permission of ARHU-Philosophy department.
Repeatable to: 3 credits if content differs.

PHIL898 Pre-Candidacy Research (1-8 Credits)

PHIL899 Doctoral Dissertation Research (1-8 Credits)

PHSC - Public Health Science

PHSC401 History of Public Health (3 Credits)
Emphasis is on the history of public health in the Western world from antiquity to the present. Also examines the influence of public health developments as they relate to the Western world as well as throughout diverse cultures and societies across the globe. Analysis focuses on the interaction among Western and non-Western cultures with respect to health issues, including science, policies, prevention and treatment.
Restriction: Must be in Public Health Science program; and must have earned a minimum of 45 credits.
Credit Only Granted for: PHSC401 or SPHL401.
Formerly: SPHL401.

PHSC402 Public Health Emergency Preparedness (3 Credits)
Intensive introduction to public health emergency preparedness. Course will provide students with an overview of the role of public health in planning, prevention, preparedness, response, and recovery from disasters, both manmade and natural.
Restriction: Must be in Public Health Science program; and must have earned a minimum of 60 credits.
Credit Only Granted for: PHSC402 or SPHL402.
Formerly: SPHL402.

PHSC405 Policy Advocacy and Public Health (3 Credits)
Students will identify and analyze policy solutions to public health problems and determine advocacy strategies to encourage policy makers to implement the recommendations. Lectures, class discussions, group work and mock advocacy exercises will integrate the principles and practice of public health advocacy. Guest lecturers from a variety of settings will give students a broad range of perspectives and advocacy experiences.
Prerequisite: Minimum grade of C- in HLSA300.
Restriction: Must be in Public Health Science program; and must have earned a minimum of 60 credits.

PHSC410 Public Health Program Planning and Evaluation (3 Credits)
Students will become familiar with the dynamics of public health program planning, and the basic process of identifying unmet needs. They will be able to identify different types of program evaluation, including needs assessment, formative research, process evaluation, impact assessment, and cost analysis.
Restriction: Must be in Public Health Science program; and junior standing or higher.
Credit Only Granted for: PHSC410 or SPHL410.
Formerly: SPHL410.

PHSC412 Food, Policy, and Public Health (3 Credits)
Broad overview of the impact of food and food policy on public health. Course covers topics such as access to food, food systems, influence of food policies on the individual, the cost of food, influences on food selection, food safety risks and responses, nutrition-related health challenges, and a comparison of US food/nutrition issues with those of other nations.
Prerequisite: Must have completed HLSA300 with a C- or higher.
Recommended: NFSC100.
Restriction: Must be in Public Health Science program; and junior standing or higher.
Credit Only Granted for: PHSC412 or SPHL412.
Formerly: SPHL412.

PHSC415 Essentials of Public Health Biology: The Cell, The Individual, and Disease (3 Credits)
Presents the basic scientific and biomedical concepts of modern public health problems and explores in depth mechanisms and models of the major categories of disease. The biologic principles presented are foundations to public health disease prevention, control, or management programs.
Prerequisite: Minimum grade of C- in BSCI202.
Recommended: BSCI223.
Restriction: Must be in Public Health Science program; and junior standing or higher.
Credit Only Granted for: PHSC415, SPHL415 or SPHL498J.
Formerly: SPHL415 and SPHL498J.

PHSC420 Vaccines and Immunology (3 Credits)
An exploration of immunology and vaccines through a public health lens. We will examine the cells, systems, and molecules that comprise the human immune system and defend your body against disease. In addition, we will discuss the strategies used during vaccine development including the history and future of vaccination and how increased understanding of the immune system has allowed scientists to improve and refine the process. Finally we will examine the current social and political situation surrounding vaccination and the roles and responsibility of public health practitioners.
Prerequisite: Minimum grade of C- in BSCI223.
Recommended: CHEM231.
Restriction: Must have earned a minimum of 60 credits. And must be in Public Health Science program; or permission of instructor.

PHSC425 Genetics, Genomics, and Public Health (3 Credits)
Recent advances in genomic science and biomedical technologies have increased our understanding of the genetic basis of disease and the interplay between genetics and environmental and behavioral factors. This course will provide a solid background in basic genetics and genomic science and highlight the role of public health professionals in translating breakthroughs in this rapidly transforming field into the clinical setting, program planning, and policy. Topics covered will include the molecular basis for genetic variation, fetal and newborn screening, genetic risk factors for cancer, pharmacogenetics, the role of pathogen genomics in outbreak investigation, and applications of genetic engineering in solving public health issues.
Prerequisite: Must have completed BSCI170 and 171 with a C- or higher.
Recommended: BSCI222 and BSCI223.
Restriction: Must have earned a minimum of 60 credits; and must be in Public Health Science program.
Credit Only Granted for: SPHL498X OR PHSC425.
Formerly: SPHL498X.

PHSC426 Climate Change and Health (3 Credits)
Climate changes pose significant risks to population health by affecting air quality, the availability of safe drinking water, infectious disease transmission, food security, and access to housing, land, and livelihoods. Students examine the relationship between climate change and human health, focusing on how climate change vulnerability varies between populations by geographic, demographic, and socioeconomic characteristics.
Prerequisite: Minimum grade of C- in MIEH300.
Restriction: Must be in Public Health Science program.

PHSC430 Public Health in the City: Perspectives on Health in the Urban Environment (3 Credits)
Exposure to issues related to city habitation and the health of the public, including how the urban environment impacts the lives and health of city dwellers, including discussion of the social determinants of health. Students are encouraged to think about urban health and policy, and to question the current state of urban public health. Issues of race, class, and equality will be discussed throughout the course as they relate to each of these topics.
Prerequisite: Minimum grade of C- in BSCI202 and MIEH300.
Restriction: Must be in Public Health Science program; and junior standing or higher.
Credit Only Granted for: PHSC430 or SPHL498G.
Formerly: SPHL498G.

PHSC440 Public Health Nutrition (3 Credits)
Engages students in conceptual thinking about the relationship between public health and nutritional health. Students will analyze and interpret "A Framework for Public Health Nutrition." Students will identify determinants of nutritional health, assess nutritional health in individuals and populations, develop strategies to mitigate these issues, and analyze and evaluate public health nutrition policies.
Prerequisite: A minimum of C- in BSCI170, BSCI171, CHEM131, CHEM132 and EPIB301.
Restriction: Must be in Public Health Science program.
Credit Only Granted for: PHSC440 or NFSC498L.

PHSC497 Public Health Science Capstone (3 Credits)
The capstone course is the culminating experience for Public Health Science students and must be taken only in the final semester of study. The Public Health Science capstone course is designed to challenge students to integrate the five core areas of public health in investigating, researching and addressing public health issues. Throughout the semester, students will be required to evaluate, analyze and synthesize scholarly works as they research and propose solutions to a variety of public health issues. By the conclusion of this research based course, students will understand how the various public health perspectives can combine in addressing and informing public health practices.
Prerequisite: Must have completed the professional writing requirement with a C- or higher; and minimum grade of C- in MIEH400.
Restriction: Must have earned a minimum of 100 credits; and must be in Public Health Science program; and must be in the final semester of undergraduate study.
Credit Only Granted for: SPHL498F or PHSC497.
Formerly: SPHL498F.

PHYS - Physics

PHYS401 Quantum Physics I (4 Credits)
Introduces some quantum phenomena leading to wave-particle duality. Schroedinger theory for bound states and scattering in one dimension. One-particle Schroedinger equation and the hydrogen atom.
Prerequisite: PHYS371 and PHYS373.
Formerly: PHYS421.

PHYS402 Quantum Physics II (4 Credits)
Quantum states as vectors; spin and spectroscopy, multiparticle systems, the periodic table, perturbation theory, band structure, etc.
Prerequisite: PHYS401.

PHYS404 Introduction to Statistical Thermodynamics (3 Credits)
Introduction to basic concepts in thermodynamics and statistical mechanics.
Prerequisite: PHYS371 or PHYS420.

PHYS405 Advanced Experiments (3 Credits)
Advanced laboratory techniques. Selected experiments from many fields of modern physics. Emphasis on self-study of the phenomena, data analysis, and presentation in report form.
Prerequisite: PHYS375.
Restriction: Must be in a major within CMNS-Physics department.

PHYS407 Undergraduate Experimental Research (3 Credits)
Students develop and complete an independent, experimental research project with a professor in the Physics Department. The project should be a continuation of work done in PHYS499A. To obtain permission, students must submit a proposal describing the experimental work to be completed and this proposal must be approved by their faculty mentor, the associate chair for undergraduate education and the chair of the laboratory committee. Students must maintain a lab notebook, give an oral presentation and complete a written report on their research that includes data and error analysis.
Prerequisite: PHYS499 and PHYS375; and permission of CMNS-Physics department.
Restriction: Must be in a major within CMNS-Physics department; and senior standing.

PHYS410 Classical Mechanics (4 Credits)
Theoretical foundations of mechanics with extensive application of the methods. Various mathematical tools of theoretical physics.
Prerequisite: PHYS373.

PHYS411 Intermediate Electricity and Magnetism (4 Credits)
Foundations of electromagnetic theory, with extensive applications of the methods. Thorough treatment of wave properties of solutions of Maxwell's equations.
Prerequisite: PHYS373.

PHYS420 Principles of Modern Physics (3 Credits)
A survey of atomic and nuclear phenomena and the main trends in modern physics. Appropriate for students in engineering and other physical sciences.
Prerequisite: MATH246. And PHYS271 and PHYS270; or PHYS273.
Credit Only Granted for: PHYS371 or PHYS420.

PHYS428 Physics Capstone Research (2-4 Credits)
Individual, focused research under the guidance of a faculty member. Discussion, presentations and, if appropriate, research group projects involved. Student must submit final research paper for completion of course. Paper may also serve as thesis required for High Honors in Physics. Not intended as a general "reading course" (see PHYS499).
Restriction: Must be in a major within CMNS-Physics department; and senior standing or higher; and permission of instructor.
Repeatable to: 4 credits.

PHYS429 Atomic and Nuclear Physics Laboratory (3 Credits)
Classical experiments in atomic physics and more sophisticated experiments in current techniques in nuclear physics.
Prerequisite: PHYS405.

PHYS431 Introduction to Solid State Physics (3 Credits)
Classes of materials; introduction to basic ideal and real materials' behavior including mechanical, electrical, thermal, magnetic and optical responses of materials; importance of microstructure in behavior. One application of each property will be discussed in detail.
Prerequisite: PHYS271, PHYS270, and MATH241.
Restriction: Junior standing or higher; and must be in the Engineering: Materials Science program or Physics program. Cross-listed with: ENMA460.
Credit Only Granted for: ENMA460 or PHYS431.
Additional Information: Materials Engineering students take ENMA460 and Physics students take PHYS431.

PHYS441 Topics in Nuclear and Particle Physics (3 Credits)
A survey of concepts in particle and nuclear physics, with a topical emphasis on the impact of the Weak Interaction and the discovery of Parity Violation.
Prerequisite: PHYS401 or PHYS402.
Corequisite: PHYS402.

PHYS444 Computing Beyond the Standard Model of Particle Physics (3 Credits)
An exploration of the computing languages and techniques used to analyze large data sets in Large Hadron Collider physics with some discussion of applications in unrelated fields.
Prerequisite: PHYS371 and PHYS373; or permission of instructor.

PHYS457 Introduction to Quantum Computing (3 Credits)
An introduction to the concept of a quantum computer, including algorithms that outperform classical computation and methods for performing quantum computation reliably in the presence of noise. As this is a multidisciplinary subject, the course will cover basic concepts in theoretical computer science and physics in addition to introducing core quantum computing topics.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, PHYS274); and 1 course with a minimum grade of C- from (CMSC351, PHYS373).
Restriction: Permission of CMNS-Physics department; or permission of CMNS-Computer Science department. Cross-listed with CMSC4 57.
Credit Only Granted for: PHYS457 or CMSC457. Additional infor mation: No previous background in quantum mechanics is required.

PHYS474 Computational Physics (3 Credits)
This course provides an overview of some of the most widely used methods of computational physics, including numerical integration (elementary algorithms and Monte Carlo techniques), numerical solutions of differential equations (classical equations of motion, time independent and time dependent Schrodinger equations), molecular dynamics simulations (classical many-body systems), and Monte Carlo simulations (classical models of magnetism). In addition to giving the students a basic working knowledge of these particular techniques, the goal is to make them proficient in scientific computing and programming in general, so that they will be prepared to tackle also other computational problem that they may encounter in the future.
Prerequisite: PHYS404; and PHYS373; and (PHYS165, CMSC106, or CMSC131). Or permission of instructor.

PHYS485 Electronic Circuits (4 Credits)
Theory and application to experimental physics of modern semiconductor analog and digital circuits. Emphasis on understanding passive and active elements in practical circuits. Topics span the range from simple transistor circuits to microcomputers.
Prerequisite: PHYS405.
Corequisite: PHYS374.
Restriction: Must be in a major within CMNS-Physics department.

PHYS499 Special Problems in Physics (1-16 Credits)
Research or special study. Credit according to work done.

PHYS601 Theoretical Dynamics (3 Credits)
Lagrangian and Hamiltonian mechanics, two-body central force problem, rigid body motion, small oscillations, continuous systems.
Prerequisite: PHYS410; or students who have taken courses with comparable content may contact the department.

PHYS603 Methods of Statistical Physics (3 Credits)
Foundations and applications of thermodynamics and statistical mechanics.
Credit Only Granted for: PHYS602 or PHYS603.

PHYS604 Methods of Mathematical Physics (3 Credits)
Ordinary and partial differential equations of physics, boundary value problems, Fourier series, Green's functions, complex variables and contour integration.
Prerequisite: Must have completed coursework in advanced calculus; and (PHYS411 and PHYS410). Or students who have taken courses with comparable content may contact the department.

PHYS606 Electrodynamics (4 Credits)
Classical electromagnetic theory, electro- and magnetostatics, Maxwell equations, waves and radiation, special relativity.
Prerequisite: PHYS604; or students who have taken courses with comparable content may contact the department.

PHYS610 Mathematical Methods and Their Applications in Classical Mechanics and Electrodynamics I (4 Credits)
First course of a two-semester graduate level sequence on classical mechanics, electrodynamics and relativity and the mathematics that underlie these subjects. Mathematical methods will generally be introduced in the context of relevant physical problems.
Prerequisite: Must have an outstanding undergraduate background in physics.
Restriction: Permission of CMNS-Physics Department.

PHYS612 Quantum and Statistical Physics I (4 Credits)
First course of a two-semester graduate level sequence on topics in quantum mechanics and statistical mechanics.
Prerequisite: Must have an outstanding undergraduate background in physics.
Restriction: Permission of CMNS-Physics Department.

PHYS615 Nonlinear Dynamics of Extended Systems (3 Credits)
Theory and applications of nonlinear dynamics of extended systems including nonlinear waves, pattern formation, turbulence, self-organized criticality and networks. Additional topics to be selected by instructor from areas of current research.
Prerequisite: PHYS601.

PHYS622 Introduction to Quantum Mechanics I (4 Credits)
First and second semesters. A study of the Schroedinger equation, matrix formulations of quantum mechanics, approximation methods, scattering theory, etc. Applications to solid state, atomic, and nuclear physics.
Prerequisite: Must have an outstanding undergraduate background in physics.

PHYS623 Introduction to Quantum Mechanics II (3 Credits)
First and second semesters. A study of the Schroedinger equation, matrix formulations of quantum mechanics, approximation methods, scattering theory etc., and applications to solid state, atomic, and nuclear physics. Continuation of PHYS 622.
Prerequisite: Must have an outstanding undergraduate background in physics.

PHYS624 Advanced Quantum Mechanics (3 Credits)
Relativistic wave equations, second quantization in many body problems and relativistic wave equations, Feynman-Dyson perturbation theory, applications to many body problems, application to quantum electrodynamics, elements of renormalization.
Prerequisite: PHYS623.

PHYS625 Non-relativistic Quantum Mechanics (3 Credits)
Non-relativistic second quantization, single particle Green's function, perturbation theory, linked cluster expansion, Feynman and Goldstone diagrams; applications to imperfect Fermi gases; superconductivity.
Prerequisite: PHYS623.

PHYS662 Intersections of Technology and Policy: Modernizing the Energy System (3 Credits)
A broad, practical introduction to the issues and assessment approaches used to evaluate technical innovation in the Energy System. Introduction to the use of Sankey Diagrams, Life Cycle Analysis, Techno-economic analysis, and Equilibrium Economic Analysis, as well as policy factors such as Energy Efficiency Standards, Vehicle Fuel Economy, Feed-in-tariffs and environmental regulations.
Restriction: Must be a graduate student in the Natural Sciences, Engineering, Public Policy, or Economics; or must be a senior in the above disciplines with a minimum cumulative GPA of 3.0.
Credit Only Granted for: PHYS662 or PLCY699B.

PHYS675 Introduction to Relativity, Gravitation and Cosmology (3 Credits)
Review of special relativity, followed by a study of the equivalence principle, curved spacetimes, and Einstein's equations. Selected applications to the solar system, stellar structure, black holes, gravitational waves, and cosmology.
Prerequisite: PHYS606 and PHYS601.

PHYS685 Research Electronics (4 Credits)
An integrated lecture and laboratory course in electronics with equal emphasis on experimental methods and results and analysis using device models and up-to-date mathematical and numerical tools. Experiments and analysis of circuits with passive and single active devices form the background for the study of operational amplifiers, digital integrated circuits and systems, and microcomputers. The general topics of impedance matching, frequency response, feedback, interfacing and the extraction of signal from noise are stressed.
Prerequisite: PHYS374 or PHYS405; or students who have taken courses with comparable content may contact the department.
Restriction: Must not have completed PHYS485.
Credit Only Granted for: PHYS485 or PHYS685.

PHYS708 Seminar in Teaching College Physics (1 Credit)

PHYS709 Seminar in General Physics (1 Credit)

PHYS715 Chaotic Dynamics (3 Credits)
Theory and applications of chaos in dynamical systems including such topics as strange attractors, Lyapanov exponents, quasiperiodicity, period doubling, intermittency, crises, fractal basin boundaries, chaotic scattering, KAM tori, and quantum chaos.
Prerequisite: PHYS601.

PHYS718 Seminar in General Physics (1 Credit)

PHYS719 Seminar in General Physics (1 Credit)

PHYS720 Quantum Technology (3 Credits)
Physical principles behind emerging quantum technologies, from quantum-limited amplifiers to atomic simulators. Examination of current and emerging platforms for quantum technologies, including neutral atom, ion trap, superconducting circuit, photonic, and spin-based approaches. Focus on hurdles for implementing quantum devices for new applications.
Prerequisite: A good grounding in electromagnetism and quantum mechanics is necessary; familiarity with density matrices and master equations will be helpful.

PHYS721 Atomic and Optical Physics I (Survey) (3 Credits)
A survey of topics involving the physics of atoms and their interaction with radiation, including atoms in external fields, lasers, atomic spectroscopy and atomic structure.
Prerequisite: PHYS623.

PHYS728 Seminar in Atomic and Molecular Physics (1 Credit)

PHYS731 Solid State Physics: Survey (3 Credits)
A variety of topics such as crystal structure, mechanical, thermal, electrical, and magnetic properties of solids, band structure, the Fermi surface, and superconductivity will be treated. Although the emphasis will be on the phenomena, the methods of quantum mechanics are freely employed in this description.

PHYS732 Introduction to Solid State Physics II (3 Credits)
Second semester of survey course in condensed matter physics including topics in semiconductors, surface physics, magnetism and superconductivity.
Prerequisite: PHYS731.

PHYS738 Seminar in Experimental Solid State Physics (1 Credit)

PHYS739 Seminar in Theoretical Solid State Physics (1 Credit)

PHYS741 Nuclear Physics: Survey (3 Credits)
An introductory survey of nuclear physics, including the following topics: properties of the two-nucleon force and the most popular phenomenological potentials; properties of nuclei including radii, shapes and charge distributions; introduction to nuclear structure models, including collective, independent particle, and shell model; basic features of radioactivity including weak interactions and alpha decay; introduction to nuclear reactions, including phenomenological optical potentials and distorted wave approximations.
Prerequisite: PHYS623 and PHYS622.

PHYS748 Seminar in Experimental Nuclear Physics (1 Credit)

PHYS749 Seminar in Theoretical Nuclear Physics (1 Credit)

PHYS752 Elementary Particle Physics II: Theory (3 Credits)
Survey of elementary particles and their properties, quantum field theory, meson theory, weak interactions, possible extensions of elementary particle theory.
Prerequisite: PHYS751 and PHYS624.

PHYS758 Seminar in Elementary Particles and Quantum Field Theory (1 Credit)

PHYS759 Seminar in Elementary Particles and Quantum Field Theory (1 Credit)

PHYS761 Plasma Physics I: Survey (3 Credits)
A detailed study of plasma physics. The first semester treats particle orbit theory, magnetohydrodynamics, plasma waves, and transport phenomena.
Prerequisite: PHYS606 and PHYS604.

PHYS762 Plasma Physics II (3 Credits)
Continuation of PHYS 761. Vlasov theory, including waves, stability, and weak turbulence, kinetic equation theories of correlations and radiative processes.
Prerequisite: PHYS761.

PHYS769 Seminar in Plasma Physics (1 Credit)

PHYS778 Seminar in Space and Cosmic Ray Physics (1 Credit)

PHYS779 Seminar in General Relativity (1 Credit)

PHYS780 Network Science Literature Survey Seminar (1 Credit)
Identify and develop a research project in Network Science. Practice communicating scientific results and concepts to individuals in their own field and in other fields to which the research is applicable.
Credit Only Granted for: PHYS780 or PHYS798T.
Formerly: PHYS798T.

PHYS782 Interdisciplinary Research and Communication Practicum for Data-Driven Science (3 Credits)
Semester-long, individual research project under the direction of a faculty mentor. Students will concurrently use this project to develop and refine their communication skills of scientific concepts. Will address interdisciplinary communication with some discussion of data exploration, analysis, and visualization.
Credit Only Granted for: PHYS782 or PHYS798N.
Formerly: PHYS798N.

PHYS798 Special Problems in Advanced Physics (1-3 Credits)
Projects or special study in advanced physics.

PHYS799 Master's Thesis Research (1-6 Credits)

PHYS808 Special Topics in General Physics (1-4 Credits)
Credit according to work done.

PHYS809 Special Topics in General Physics (1-4 Credits)
Credit according to work done.

PHYS818 Special Topics in General Physics (1-4 Credits)
Credit according to work done.

PHYS819 Special Topics in General Physics (1-4 Credits)
Credit according to work done.

PHYS828 Special Topics in Atomic and Molecular Physics (1-4 Credits)
Credit according to work done.

PHYS829 Special Topics in Quantum Mechanics and Quantum Electronics (1-4 Credits)
Credit according to work done.

PHYS838 Special Topics in Experimental Solid State Physics (1-4 Credits)
Credit according to work done.

PHYS839 Special Topics in Theoretical Solid State Physics (1-4 Credits)
Credit according to work done.

PHYS849 Special Topics in Theoretical Nuclear Physics (1-4 Credits)
Credit according to work done.

PHYS851 Advanced Quantum Field Theory (3 Credits)
Renormalization, unitarity, gauge theory, S-matrix construction.
Prerequisite: PHYS624.

PHYS858 Special Topics in Elementary Particles and Quantum Field Theory (1-4 Credits)
First semester.
Prerequisite: PHYS752 and PHYS851.

PHYS859 Special Topics in Elementary Particles and Quantum Field Theory (1-4 Credits)
Credit according to work done.

PHYS869 Special Topics in Plasma Physics (1-4 Credits)
Credit according to work done.

PHYS878 Special Topics in Space and Cosmic Ray Physics (1-4 Credits)
Credit according to work done.

PHYS879 Special Topics in General Relativity (1-4 Credits)
Credit according to work done.

PHYS888 Special Topics in Applied Physics (2 Credits)

PHYS889 Special Topics in Interdisciplinary Problems (1-4 Credits)
Credit according to work done.
Restriction: Permission of instructor.

PHYS898 Pre-Candidacy Research (1-8 Credits)

PHYS899 Doctoral Dissertation Research (1-8 Credits)

PLCY - Public Policy

PLCY400 Senior Capstone (3 Credits)
Public Policy students will take the skills and knowledge gained through their curriculum and apply them through their senior capstone course. Students will work in teams on problems and issues presented by outside clients, with guidance from faculty facilitators and interaction with the clients. Each team will work with the client to address a particular problem and produce a mutually agreed upon outcome. These hands on projects will advance students' understanding of the analytical, leadership, communication and problem solving skills necessary to address today's policy problems while allowing them to gain professional level experience that could contribute to their success in their post UMD endeavors. The course will conclude with an event that allows all teams to present their findings and outcomes to their client while being evaluated by faculty and public policy professionals.
Prerequisite: PLCY306.
Restriction: Permission of PLCY-School of Public Policy; and must have earned a minimum of 90 credits.

PLCY401 Contemporary Issues in Public Policy (3 Credits)
An integrative course that allows policy students to explore the complexities of the policy-making process from the perspective of specific policy topics. They will learn about and discuss subject- based issues in a seminar format led by faculty and policy experts. Site visits to federal agencies, guest speakers, and round table sessions ensure that students receive a variety of real-world perspectives on their chosen policy area.
Restriction: Must have earned a minimum of 90 credits.

PLCY610 Quantitative Aspects of Public Policy (3 Credits)
Introduces statistical methods needed for evaluating and choosing among policy options. Topics include probability; decision-making under uncertainty; the organization, interpretation, and visual display of complex data; prediction and inferences about causality; hypothesis testing; and linear and multiple regression. Develops analytical skills and the ability to apply theory to complex, real-world problems.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY610 or PUAF610.
Formerly: PUAF610.

PLCY611 Quantitative Analysis of Policy Issues (3 Credits)
Study of a series of problems and the development of quantitative techniques to describe or evaluate the problem. The organization and interpretation of complex data and its use for prediction and inference about casual effects. The definition of objectives, trade-offs among objectives, and allocation of resources to meet objectives. Sensitivity of outcomes to changing conditions.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY611 or PUAF611.
Formerly: PUAF611.

PLCY620 Political Analysis (3 Credits)
Examination of politics as a process for allocating scarce resources among claimants for public benefits. Comparision of the allocative model of politics with other distributive processes, such as markets. Comparison of the model with behavior of different political institutions, such as Congress and the presidency. Study of politics as a process with distinctive concepts of rationality. The translation of voter and interest group preferences into public choices. The impact of political decisions on competing constituencies.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY620 or PUAF620.
Formerly: PUAF620.

PLCY640 Microeconomic and Policy Analysis (3 Credits)
Applies intermediate microeconomic theory to public policy issues: resource allocation by firms and consumers; the response of economic agents to changes in incentives; market allocations in competitive and non-competitive environments; and market failures and government remedies. Uses extended case studies of particular issues in such areas as the environment (acid rain), international trade (tariffs), industry regulation (cable TV), and the provision of public goods (highways).
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY640 or PUAF640.
Formerly: PUAF640.

PLCY641 Macroeconomics and Policy Analysis (3 Credits)
Studies the behavior of the economy as a whole: the level of national income, unemployment, and inflation; the vulnerability of the U.S. economy to external influences; possible federal influence over the level of economic activity; and the consequences for prices, employment and the U.S. trade deficit. Also examines possible U.S. policy responses to widespread debt crises in developing countries.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY641 or PUAF641.
Formerly: PUAF641.

PLCY650 Moral Dimensions of Public Policy (3 Credits)
Explores the moral issues involved in public policy questions; the limits and usefulness of decision-making tools; problems of choosing, justifying and using criteria to judge a program's success and suitability; ethichal issues involving the welfare state and income distribution; and possible obligations beyond one's political community and generation.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY650 or PUAF650.
Formerly: PUAF650.

PLCY660 Environmental Policy Workshop (3 Credits)
Students work as a team to analyze and recommend responses to a current enviornmental policy issue. Emphasizes problem definition, organization of information and presentation of results.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY660 or PUAF660.
Formerly: PUAF660.

PLCY670 Public Budgeting & Financial Management (3 Credits)
Covers how governments raise, spend, borrow, and manage public funds. Reviews federal,state, and local budget processes and introduces analytical techniques including basic spreadsheet skills, evaluating alternative revenue sources, revenue and expenditure forecasting, cost allocation, capital budgeting, cost-benefit analysis, discounting and present value, bond analysis, cash management and intergovernmental finance.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLYC670 or PUAF670.
Formerly: PUAF670.

PLCY671 Public Sector Finance (3 Credits)
The goal of this course is to provide a useful overview of basic public sector financial management principles in a simulated managerial situation to midcareer students currently working in government and nonprofit organizations.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY671 or PUAF671.
Formerly: PUAF671.

PLCY688 Topics in Public Policy (1-3 Credits)
Special topics in Public Policy.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of instructor.
Repeatable to: 18 credits if content differs.
Credit Only Granted for: PLCY688 or PUAF688.
Formerly: PUAF688.

PLCY689 Public Policy Topics (1-3 Credits)
Special Topics in Public Policy.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of instructor.
Repeatable to: 18 credits if content differs.
Credit Only Granted for: PLCY689 or PUAF689.
Formerly: PUAF689.

PLCY692 Leadership Principles and Practices (3 Credits)
This course will introduce leadership principles and practices to students by focussing on the theory of leadership, different leadership themes and skills, and discussions with practitioners.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY692 or PUAF692.
Formerly: PUAF692.

PLCY698 Selected Topics in Public Affairs (1-3 Credits)
Special topics that arise in public policy.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.

PLCY699 Selected Topics Public Policy (1-3 Credits)
Special topics that arise in public policy.
Restriction: Must be in a major in PLCY-School of Public Policy; and permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY699 or PUAF699.
Formerly: PUAF699.

PLCY700 U.S. Trade: Policy and Politics (3 Credits)
Interplay between government and private interests in shaping official actions that affect international trade. Policy tools available to influence balance, magnitude, and composition of imports and exports. Evolution of executive, congressional and quasi-judicial government institutions under increased U.S. international trade exposure and trade deficit.
Prerequisite: PUAF641, PUAF620, and PUAF640.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY700 or PUAF700.
Formerly: PUAF700.

PLCY706 Public Policymaking for Journalists (3 Credits)
Focuses on the political, procedural and administrative realities of policy formation and implementation. Specifically for the Journalism students who staff the Capital News Service.
Restriction: Must be in a major in JOUR-Philip Merrill College of Journalism.
Credit Only Granted for: PLCY706 or PUAF706.
Formerly: PUAF706.

PLCY711 Public Management and Leadership (3 Credits)
Reviews the managerial, political, and ethical problems faced by public sector managers and leaders, including setting an organization's goals, obtaining and protecting a program mandate, designing a service delivery system and implementing a new program.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY711 or PUAF711.
Formerly: PUAF711.

PLCY712 Analysis of Fiscal Conditions (3 Credits)
The financial operations of U.S. government at various levels, with emphasis on local governments. Practical problems in revenue management, including revenue forecasting and cash flow analysis; debt management operations, such as borrowing; intergovernmental financial operations, such as grants management and reporting requirements, and personnel management issues that have a direct bearing on governmental finances.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY712 or PUAF712.
Formerly: PUAF712.

PLCY715 Government and Non-Profit Accounting (3 Credits)
Basic accounting practices of governmental and non-profit organizations. Emphasis on presentation of data in assessing an organization's financial health, financial data by organizations, structuring of accounting information to achieve management control, way in which evolving national standards influence kinds of information organizations have to apply in the future.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY715 or PUAF715.
Formerly: PUAF715.

PLCY716 State and Local Government Budgeting (3 Credits)
State and local government practices as a laboratory for studying public sector financial management.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY716 or PUAF716.
Formerly: PUAF716.

PLCY717 Federal Budgeting: Policy and Process (3 Credits)
Budgeting as a political and administrative instrument of government. Development of budgeting, the multiple uses of the budget, including role in fiscal policy and resource allocation, the roles and relationships of major participants, and effects of resource scarcity on budgeting behavior. Emphasis on the federal level.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY717 or PUAF717.
Formerly: PUAF717.

PLCY720 International Security Policy (3 Credits)
Reviews the principal features of international security as currently practiced. Traces the evolution of contemporary policy beginning with the initiation of nuclear weapons programs during World War II. Particular emphasis is given to experience of the United States and Russia, since the historical interaction between these two countries has disproportionately affected the international security conditions that all other countries now experience.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY720 or PUAF720.
Formerly: PUAF720.

PLCY722 Terrorism and Democracy (3 Credits)
United States government's decision process for dealing with crises; the options available to a president for deterring and handling incidents of terrorism, and how a president can and should select between the options.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY722 or PUAF722.
Formerly: PUAF722.

PLCY724 Problems of Global Security (3 Credits)
Explores the international security implications of globalization, presenting evidence indicating that altered circumstances will eventually induce a major redesign of prevailing security arrangements. Includes three segments: 1) a review of the principal problems that have been the focus of established security policy and would be the context for any major adjustment of policy; 2) an assessment of relationships with the major countries where traditional problems are most acutely present; and 3) a review of the organizing principles that can be expected to emerge in the new situation.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY724 or PUAF724.
Formerly: PUAF698W and PUAF724.

PLCY732 Policy and Politics of Education Reform (3 Credits)
Examines education reform in its historical, fiscal, cultural, and lega contexts, and the changing relationship between education and economic opportunity. Focuses on institutional and normative issues, including national standards, public school choice, charter schools, vouchers and funding equity.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY732 or PUAF732.
Formerly: PUAF732.

PLCY734 Foundations of Social Policy (3 Credits)
Provides an overview of government's role in social policy and the history of the development of federal and state policies with respect to welfare, aging, education, and housing. Analyzes current federal institutions and legislation in the same policy areas and the demographic history of the United States. Develops skills in analytic writing and presentation of descriptive data.
Restriction: Must be in a major in PLCY-School of Public Policy.
Credit Only Granted for: PLCY734 or PUAF734.
Formerly: PUAF734.

PLCY735 Health Policy (3 Credits)
Analyzes the origins, history, status, and future of health care as problems in political and economic theory and as puzzles in policy formation. Considers current American reform controversies in the light of several disciplines and in comparison to foreign experiences and structures.
Credit Only Granted for: PLCY735 or PUAF735.
Formerly: PUAF735.

PLCY736 Managing Social Services (3 Credits)
Focuses on managing social services across federal, state, and local jurisdictions with an emphasis on how strong management can improve results. Exposes students to management thought and philosophy as applied to different social services and social policy challanges within various operating environments and programmatic settings. The watchwords for this course are "management" and "applied".
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PUAF736, PLCY736 or PUAF698V.
Formerly: PUAF698V and PUAF736.

PLCY737 Strategies of Equality (3 Credits)
Concentrates on the institutional and political means by which disadvantaged segments of the United States population have sought to enhance their social, economic and political prospects. Race, gender and disability are the substantive focal points, with considerable attention given to the challanges of African American socio-political uplift. Also explores legislation, litigation, administration, agitation (i.e. protest), and constitutional reform. Students become familiar with alternative conceptions of equality and the modes of argument employed in different institutional and political contexts.
Credit Only Granted for: PLCY737 or PUAF737.
Formerly: PUAF698Y and PUAF737.

PLCY740 Public Policy and the Environment (3 Credits)
Surveys of major federal environmental legislation; the development and implementation of laws, and alternative ways of thinking about the relationship between humans and the environment.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY740 or PUAF740.
Formerly: PUAF740.

PLCY741 Global Environmental Problems (3 Credits)
Suitability of analytic tools for examining global environmental problems, human overpopulation, land abuse, ozone depletion, climate change, acid rain, loss of biological diversity, the scarcity of food, fresh water, energy and nonfuel mineral resources, and health hazards of pollutants toxic metals and radiation.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY741 or PUAF741.
Formerly: PUAF741.

PLCY742 Environmental Ethics (3 Credits)
Analyzes issues such as the relation between human beings and nature from the perspectives of the science, history, philosophy, and religion. Considers the bases for policies such as environmental regulation, public lands, and international conventions with respect to the environment.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLYC742 or PUAF742.
Formerly: PUAF742.

PLCY743 Ecological Economics (3 Credits)
Explores how taking account of the economic system's fundamental dependence on the environment alters conventional economic goals, priorities, theories, and prescriptions.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY743 or PUAF743.
Formerly: PUAF743.

PLCY744 Environment and Development (3 Credits)
Analyzes sustainable development and its conflicting interpretations. The dominant view, as expressed in the World Bank's 1992 World Development Report, is studied, along with some critical responses. Further readings on issues of population, consumption and development indicators.
Credit Only Granted for: PLCY744 or PUAF744.
Formerly: PUAF744.

PLCY745 Human Health and Environmental Policy (3 Credits)
Reviews the major human physiological systems and their integrated toxicological functions; considers key bodily defenses; and discusses classic, emerging, and ambiguous risks; in all ecological context. Applies to scientific controversy, the methods of policy formation, such as risk analysis, social-cost analysis, "outcomes" analysis, and decision analysis, all in political-economic context.
Credit Only Granted for: PLCY745 or PUAF745.
Formerly: PUAF745.

PLCY746 Dynamic Modeling for Environmental Investment and Policy Making (3 Credits)
Examines the theory, methods and tools to dynamic modeling for policy and investment decision making, with special focus on environmental issues. Provides extensive hands-on modeling experience and makes use of state-of-art computing methods to translate theory and concepts into executable models.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY746 or PUAF746.
Formerly: PUAF698M and PUAF746.

PLCY752 Managing Differences:Resolving Conflict and Negotiating Agreements (3 Credits)
Enhances the student's negotiation and leadership skills for managing differences between individuals and groups. Students study the nature of conflict, learn how to handle two and multiparty conflicts, exerting leadership where there are no hierarchy leaders, and explore the impact of facilitators and mediators on the negotiating process. Blends skill building exercises and theory discussions about the behavior of groups and individuals in groups to understand negotiation dynamics.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY752 or PUAF752.
Formerly: PUAF752.

PLCY753 Advanced Negotiations (3 Credits)
Deepens the student's negotiation and leadership skills for managing differences between individuals and groups. Cover conflict, escalation, dealing with intractable conflicts, sustaining agreements in inter-group conflicts, and the effects of trauma on negotiations.
Prerequisite: PUAF752.
Credit Only Granted for: PUAF698C, PUAF753 or PLCY753.
Formerly: PUAF698C and PUAF753.

PLCY770 Seminar in Housing and Community Development Strategies (3 Credits)
Detailed examination of community and social policy issues relating to the construction and management of affordable housing.
Restriction: Must be in a major in PLCY-School of Public Policy.
Credit Only Granted for: PLCY770 or PUAF770.
Formerly: PUAF770.

PLCY771 Housing and Community Development Overview (3 Credits)
An overview of the housing development process. Community development context, financial analysis, analytical tools including microcomputer applications, architectural and design issues, engineering constraints.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.
Credit Only Granted for: PLCY771 or PUAF771.
Formerly: PUAF771.

PLCY772 Housing Finance (3 Credits)
Fundamentals of housing investment analysis. Structuring feasibility analyses, appraisals, pro forma statements, return on investment, leverage analysis, underwriting ratios, taxation and syndication.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.
Credit Only Granted for: PLCY772 or PUAF772.
Formerly: PUAF772.

PLCY773 Housing Clinic (3 Credits)
Issues and strategies applicable to urban, suburban, and rural areas. Field experience and a team exercise, using the case study method, will give an opportunity for concrete application of the concepts to a specific set of community problems.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.
Credit Only Granted for: PLCY773 or PUAF773.
Formerly: PUAF773.

PLCY774 Asset Management (3 Credits)
Asset manager's role at each stage of the property's life cycle and property analysis, including cash flow debt and staffing. Topics include capital needs; major building systems, costs and useful lives; marketing and outreach; and anti-crime strategies. Field trips to problem properties to perform cost/benefit analysis, diagnose potential cures, and prepare action plans.
Restriction: Must be enrolled in the executive training program sponsored by the Department of Housing and Urban Development.
Credit Only Granted for: PLCY774 or PUAF774.
Formerly: PUAF774.

PLCY780 The American Foreign Policy-Making Process (3 Credits)
Survey and analysis of the governmental institutions and processes which shape U.S. global engagement on national security and international economic issues. Particular emphasis is given to executive-congressional relations and the broader domestic roots of foreign policy.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY780 or PUAF780.
Formerly: PUAF780.

PLCY781 International Economic Policy (3 Credits)
Issues and choices facing the United States in today's global economy. Primary, but not exclusive, emphasis is given to "competitive interdependence" among advanced industrial societies.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY781 or PUAF781.
Formerly: PUAF781.

PLCY782 International Development Economics (3 Credits)
Examines key current economic and policy issues for developing and transition economies. Topics include inflation stabilization, fiscal policy, selected trade issues, dealing with international capital flows, the role of multilateral organizations, such as the International Monetary Fund and the World Bank, and issues relating to saving, investment and growth.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PUAF698U, PUAF782 or PLCY782.
Formerly: PUAF698U and PUAF782.

PLCY783 Development and Foreign Aid (3 Credits)
Examines the empirical, conceptual, and ethical dimensions of international development policies and U.S. foreign aid. What is the present character of development in poor countries/regions? How should development be conceived? What development strategies are best? What is and should be the purpose of U.S. foreign aide and development assistance?
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY783 or PUAF783.
Formerly: PUAF698Q and PUAF783.

PLCY784 Disease, Disaster, and Development (3 Credits)
Studies development, the process by which needy people in fragile societies become self-sufficient people in resilient societies, in relation to disease and disaster, with particular attention to the developed world's response.
Credit Only Granted for: PUAF699D, PUAF784 or PLCY784.
Formerly: PUAF699D and PUAF784.

PLCY790 Project Course (3 Credits)
Students work at a sponsoring government agency or private firm researching problem of interest to sponsor and relevant to concentration. Emphasis on problem definition, organizing information, and both oral and written presentation of results.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY790 or PUAF790.
Formerly: PUAF790.

PLCY798 Readings in Public Policy (1-3 Credits)
Guided readings for discussions on public policy.
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY798 or PUAF798.
Formerly: PUAF798.

PLCY898 Pre-Candidacy Research (1-8 Credits)
Credit Only Granted for: PLCY898 or PUAF898.
Formerly: PUAF898.

PLCY899 Doctoral Dissertation Research (1-8 Credits)
Restriction: Must be in a major in PLCY-School of Public Policy; or permission of PLCY-School of Public Policy.
Credit Only Granted for: PLCY899 or PUAF899.
Formerly: PUAF899.

PLSC - Plant Sciences

PLSC400 Plant Physiology (4 Credits)
A survey of plant physiology and development responses and adaptation to the environment.
Prerequisite: BSCI170 and BSCI171; or BSCI105; or PLSC201. And CHEM231 and CHEM232; or CHEM237; or permission of AGNR-Plant Science & Landscape Architecture department; or permission of CMNS-Biological Sciences UG Program. Cross-listed with BSCI442.
Credit Only Granted for: BSCI442 or PLSC400.

PLSC401 Pest Management Strategies for Turfgrass (3 Credits)
Interdisciplinary view of weed, disease, and insect management from an agronomy perspective. Plant responses to pest invasion, diagnosis of pest-related disorders, and principles of weed, disease and insect suppression through cultural, biological and chemical means are discussed.
Prerequisite: PLSC305.

PLSC402 Sports Turf Management (3 Credits)
Sports turf management, including design, construction, soil modification, soil cultural techniques, pesticide use, fertilization, and specialized equipment.
Prerequisite: PLSC305 and PLSC401.

PLSC404 Plant and fungal Metabolism (3 Credits)
An introduction to biochemistry and metabolism in plants and fungi, covering the biosynthesis of compartments in plant and fungal cells with biological molecules such as nucleic acids, amino acids and lipids. Energy flow processes such as photosynthesis, carbohydrate metabolism and respiration, are covered in the course. The integration of different pathways in plant development and responses to environmental stresses will be discussed.
Prerequisite: BSCI170 and BSCI171; or PLSC201. And CHEM231 and CHEM232; or CHEM237; or permission of AGNR-Plant Science & Landscape Architecture department.

PLSC405 Agroecology (3 Credits)
How can we balance the multiple, and often competing objectives of sustainable agricultural intensification to promote both agricultural productivity and human wellbeing? The answer to this question requires a transdisciplinary, agroecological perspective. Agroecology is the integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions. This course is designed to introduce various topics in agroecology (e.g. organic agriculture, biodiversity, the Farm Bill). We will take an ecosystems approach to the study of agriculture that will enable students to analyze the environmental, social, and economic interconnections within various types of agricultural systems locally and globally.
Prerequisite: At least one course in ecology; or permission of instructor.
Recommended: BSCI361 or PLSC471; or any BSCI or ENST ecology course.
Credit Only Granted for: PLSC405 or PLSC605.
Additional Information: Class will be held on campus, with two day-long field trips to local farms.

PLSC407 Advanced Crop Science (3 Credits)
A study of principles of production for forage crops, corn, small grains, rice, millets, sorghums, soybeans and other oil seed crops. Their seed production, processing, distribution and the current federal and state seed control programs for these agronomic crops will also be discussed.
Prerequisite: PLSC112, PLSC113, BSCI160, and BSCI161.

PLSC410 Commercial Turf Maintenance and Production (3 Credits)
Agronomic programs and practices used in hydroseeding, commercial lawn care, sod production and seed production. Current environmental, regulatory and business management issues confronting the turfgrass industry.
Prerequisite: PLSC305; or permission of AGNR-Plant Science & Landscape Architecture department.

PLSC411 Plant genetics (3 Credits)
An introduction to genetic principles and technologies in plants, centered on linking phenotype to genotype. Topics include Mendelian inheritance of single and complex traits, epigenetics, population genetics and plant breeding. Examples on creating and mapping genetic mutations in both model plants and non-model crops are discussed. Current genetic and genomic approaches are highlighted, such as genome engineering and reprogramming, TILLING, and genome-wide association mapping.
Prerequisite: BSCI170; and BSCI171. Or PLSC201; or permission of AGNR-Plant Science & Landscape Architecture department.

PLSC420 Principles of Plant Pathology (4 Credits)
An introduction to the causal agents, nature and management of plant diseases with particular attention paid to economically important diseases of horticultural and agronomic crops.
Prerequisite: CHEM131, CHEM132, and PLSC201; or students who have taken courses with comparable content may contact the department.

PLSC425 Green Roofs and Urban Sustainability (1 Credit)
The integration of disciplines associated with sustainability issues. Topics range from plant science to design to policy, all of which can contribute to improving the urban environment.
Credit Only Granted for: PLSC425 or PLSC489V.
Formerly: PLSC489V.

PLSC430 Water and Nutrient Planning for the Nursery and Greenhouse Industry (3 Credits)
Skills will be developed in order to write nutrient management plans for the greenhouse and nursery industry. Completion of this course can lead to professional certification in nutrient planning by the State of Maryland after MDA examinations are passed.
Prerequisite: CHEM131 and CHEM132; or ENST200; or permission of instructor.
Recommended: PLSC432.

PLSC432 Greenhouse Crop Production (3 Credits)
The commercial production and marketing of ornamental plant crops under greenhouse, plastic houses and out-of-door conditions.
Prerequisite: PLSC201 and PLSC202; and must have completed or be concurrently enrolled in BSCI442.

PLSC433 Technology of Fruit and Vegetable Production (4 Credits)
A critical analysis of research work and application of the principles of plant physiology, chemistry and botany to practical problems in the commercial production of fruit and vegetable crops.
Prerequisite: PLSC201, PLSC271, and ENST200; or students who have taken courses with comparable content may contact the department.
Restriction: Junior standing or higher.

PLSC452 Environmental Horticulture (3 Credits)
Environmental horticulture principles used in the establishment and maintenance of plant materials in residential and commercial landscapes will be addressed. The effect of soil conditions, environmental factors, and commercial practices will be discussed in relation to the growth and development of newly-installed plant materials. Field diagnostics will be used by students to assess significant problems of plant decline. Environmental sustainability will be combined with current commercial practices of storm water management, nutrient management, and irrigation management to achieve an integrated approach to plant management.
Prerequisite: PLSC110 and PLSC111 or (PLSC112 and PLSC113); and (PLSC253 and PLSC254).

PLSC453 Weed Science (3 Credits)
Weed identification, ecology, and control (cultural, mechanical, biological, and chemical methods).

PLSC460 Application of Knowledge in Plant Sciences (3 Credits)
A capstone course based on interactions with plant science professionals and student-led class discussions. Students will apply their knowledge and experience to practical issues in the discipline, further develop critical thinking ability, and enhance their communication, teamwork, and professional skills. Topics will include nutrient management, integrated pest management, plant interactions with urban and rural ecosystems, planning of public grounds, plant biotechnology, and teaching skills.
Prerequisite: PLSC110 and PLSC111; or (PLSC112 and PLSC113); or PLSC201; or permission of instructor.
Recommended: ENGL393 and ENST200; and (PLSC389 or PLSC399).
Restriction: Senior standing or higher.

PLSC461 Cultural Management of Nursery and Greenhouse Systems: Substrates (1 Credit)
One of three 1-credit modules (PLSC461, PLSC462 and PLSC 464)covering the management techniques used in the intensive culture of plants in commercial operations. Specifically, this module covers the composition, handling, physical and chemical properties of substrates and how they should be managed to maximize plant growth.
Credit Only Granted for: PLSC461 or PLSC489T.
Formerly: PLSC489T.
Additional Information: Course material is delivered primarily online, but a four hour face-to-face lecture/lab will be held at the end of the module. PLSC 461, 462 and 464 will be taught sequentially during the semester.

PLSC462 Cultural Management of Nursery and Greenhouse Systems; Irrigation (1 Credit)
One of three 1-credit modules (PLSC461, PLSC462 and PLSC464) covering the management techniques used in the intensive culture of plants in commercial operations. Specifically, this module covers water quantity and quality issues, water supply (basic hydraulics), irrigation system design and irrigation system evaluation (performance) to maximize water application efficiency.
Credit Only Granted for: PLSC462 or PLSC489W.
Formerly: PLSC489W.
Additional Information: Course material is delivered primarily online, but a four hour face-to-face lecture/lab will be held at the end of the module. PLSC 461, 462 and 464 will be taught sequentially during the semester.

PLSC464 Cultural Management of Nursery and Greenhouse Systems: Nutrients (1 Credit)
One of three 1-credit modules (PLSC461, PLSC462 and PLSC464) covering the management techniques used in the intensive culture of plants in commercial operations. Specifically, this module covers the basics of fertilization, different fertilization strategies and nutrient use and efficiency, to optimize nutrient application practices in intensive plant production systems.
Credit Only Granted for: PLSC464 or PLSC489Z.
Formerly: PLSC489Z.
Additional Information: Course material is delivered primarily online, but a four hour face-to-face lecture/lab will be held at the end of the module. PLSC 461, 462 and 464 will be taught sequentially during the semester.

PLSC471 Forest Ecology (3 Credits)
An understanding of the forest ecosystem, its structure and the processes that regulate it are provided. It also considers changes that occur in forests, the interaction of environment and genetics in promoting ecosystem sustainability, and the role of human influences on urban forest ecosystems.
Prerequisite: PLSC201; or (BSCI160 and BSCI161); or BSCI106.

PLSC472 Capstone-Urban Forest Project Management (3 Credits)
Students will synthesize the ideas and information learned from their studies in urban forestry. Working in teams, students will complete projects involving real-world issues. Student projects will use scientific, social, political and ethical considerations in an interdisciplinary approach to provide solutions to their problem.
Prerequisite: ENST200, PLSC272, and PLSC471.
Restriction: Senior standing or higher; and must be in a major within AGNR-Plant Science & Landscape Architecture department.

PLSC473 Woody Plant Physiology (3 Credits)
Concentration is placed on physiological processes important to woody plant growth and development. Emphasis will be placed on current concepts and theories of how woody plants grow and develop, and the critical assessment of current research in woody plant physiology. Course readings will include textbook assignments and selected papers from the current scientific literature.
Prerequisite: BSCI442 or PLSC201; or students who have taken courses with comparable content may contact the department.

PLSC475 Applied Forestry Practices (3 Credits)
Focuses on the applied dynamics of a set of forest practices such as management, silviculture, measurement and inventory, preparation of a management plan, etc, within the urban/rural interface. Several field trips are included to gain hands-on experience.
Prerequisite: ENST200. And ENST360; or PLSC471. Cross-listed with ENST4 06.
Credit Only Granted for: ENST406 or PLSC475.

PLSC480 Urban Ecology (3 Credits)
Cities are rapidly increasing in number and size across the globe, transforming local ecosystems. This course examines urban environments as coupled social-ecological systems at multiple scales, from streets and parks to urban landscapes patterns and global patterns of biodiversity. Ecological principles are applied in the urban context, including habitats, biodiversity, ecological processes, and ecosystem services of urban environments, with applications to problems in urban land management, decision-making and design.
Prerequisite: PLSC471, ENST360, BSCI363, or BSCI160; or other coursework/experience considered for instructor permission.
Additional Information: Class will be held both on campus and at other locations such as the U.S. Botanic Garden, local parks, and urban and suburban locations off campus.

PLSC481 Vegetation Assessment and Analysis (2 Credits)
An overview of vegetation assessment through the collection of data in the field (e.g. plots and transects) and the analysis of existing data and remotely detected images (e.g. Aerial photographs and GIS layers).
Prerequisite: PLSC110 and PLSC111; or (BSCI160 and BSCI161); or permission of instructor.
Recommended: PLSC201, BSCI360, PLSC226, or PLSC471.

PLSC489 Special Topics in Plant Science (1-3 Credits)
A lecture and or laboratory series organized to study a selected phase of Plant Science not covered by existing courses. Credit according to time scheduled and organization of the course.
Repeatable to: 6 credits if content differs.

PLSC601 Plant Genomics (3 Credits)
An advanced course in plant genomics which is the study of genes of plant chromosomes. It will cover current topics in gene mapping, molecular markers, QTLs, gene sequencing, and genetic engineering with special focus on agriculturally important traits.
Credit Only Granted for: AGRO601, NRSC601, or PLSC601.
Formerly: NRSC601.

PLSC602 Advanced Crop Breeding II (2 Credits)
Quantitative inheritance in plant breeding including genetic constitution of a population, continuous variation, estimation of genetic variances, heterosis and inbreeding, heritability, and population movement.
Prerequisite: PLSC601; and must have completed a graduate statistics course.

PLSC605 Advanced Agroecology (3 Credits)
How can we balance the multiple, and often competing objectives of sustainable agricultural intensification to promote both agricultural productivity and human wellbeing? The answer to this question requires a transdisciplinary, agroecological perspective. Agroecology is the integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions. This course is designed to introduce various topics in agroecology (e.g. organic agriculture, biodiversity, the Farm Bill). We will take an ecosystems approach to the study of agriculture that will enable students to analyze the environmental, social, and economic interconnections within various types of agricultural systems locally and globally. Students will be required to plan and execute group discussions and learning activities.
Prerequisite: At least one course in ecology or instructor permission.
Recommended: BSCI361 or PLSC471; or any BSCI or ENST ecology course.
Additional Information: Class will be held on campus, with two day-long field trips to local farms.

PLSC608 Research Methods (2 Credits)
An overview of research methods and applications related to plant sciences. Topics covered include current research advances, professional conduct and ethics, and preparation of grant proposals, manuscripts, and scientific presentations.
Prerequisite: Permission of AGNR-Plant Science & Landscape Architecture department.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: AGRO608, NRSC608, or PLSC608.
Formerly: NRSC608.

PLSC609 Integrated Pest Management (1-4 Credits)
A modular course with an interdisciplinary approach to the theory and practice of integrated pest management. Topics of modules, each 3-4 weeks long, vary each semester over a three year time frame, with the first module serving as a prerequisite for all other modules. See www.EntmClasses.umd.edu for description of modules.
Restriction: Permission of instructor.
Repeatable to: 10 credits if content differs. Cross-listed with ENTM609.
Credit Only Granted for: ENTM609, NRSC609, or PLSC609.
Formerly: NRSC609.

PLSC618 Advances in Research; Critiquing Primary Plant Science Literature (1 Credit)
Discussion of advances in plant science research based on classic and current scientific literature.
Repeatable to: 7 credits.

PLSC619 Seminars in Plant Science and Landscape Architecture (1 Credit)
Enhancement of student learning and enrichment of student curriculum for the Plant Science Graduate Program through a combination of research seminar attendance and post-seminar discussion. Research seminars will be given by prominent scientists in the field of plant sciences and post-seminar discussions will be facilitated by the instructor along with student discussion leaders.
Repeatable to: 7 credits if content differs.

PLSC682 Methods of Plant Science Research (4 Credits)
The application of biochemical and biophysical methods to problems in biological research with emphasis on plant materials.
Credit Only Granted for: HORT682, NRSC682, or PLSC682.
Formerly: NRSC682.

PLSC685 Advanced Plant Ecophysiology (3 Credits)
Growth, productivity and survival are intimately linked to a plant's ability to adjust to its environment. The information provided in this course is designed to provide an introduction to the basic physical and psysiological principles necessary for understanding the interactions between plants and their environment. The overall objective of this course is to understand plant responses and adaptations to the environment and the ecological relevance of these responses.
Prerequisite: Must have completed one course in plant physiology.
Credit Only Granted for: NRSC685 or PLSC685.
Formerly: NRSC685.

PLSC689 Special Topics (1-3 Credits)
Credit according to time scheduled and organization of the course. Organized as a lecture series on a specialized advanced topic.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: HORT689, NRSC689, or PLSC689.
Formerly: NRSC689.

PLSC782 Physiology, Biochemical and Molecular Biology of Herbicides and Plant Growth Regulators (3 Credits)
In this class we will study natural and synthetic chemicals which regulate the growth and development of plants. The mechanism by which herbicides and plant growth regulators express their activity on plants and the impact of these chemicals on the environment will be a primary focus of this course. The interaction of these chemicals with biotechnology advances will also be examined.
Prerequisite: BSCI442.
Credit Only Granted for: NRSC782 or PLSC782.
Formerly: NRSC782.

PLSC785 Advanced Post-Harvest Physiology (3 Credits)
Physiological, biochemical and molecular aspects of senescence of detached plant organs, such as fruits, leaves and flowers.
Prerequisite: PLSC474 and BCHM461; or permission of AGNR-Plant Science & Landscape Architecture department.
Credit Only Granted for: NRSC785 or PLSC785.
Formerly: NRSC785.

PLSC789 Advances in Research (1 Credit)
Discussion of advances in plant science research based on classic and current scientific literature.
Repeatable to: 7 credits if content differs.
Credit Only Granted for: AGRO789, NRSC789, or PLSC789.
Formerly: NRSC789.

PLSC798 Graduate Seminar (1 Credit)
First and second semester.
Repeatable to: 6 credits if content differs.
Credit Only Granted for: AGRO798, HORT798, NRSC798, or PLSC798.
Formerly: NRSC798.

PLSC799 Master's Thesis Research (1-6 Credits)

PLSC802 Epidemiology and Plant Disease Mangement (3 Credits)
An in-depth advanced course for graduate students in plant pathology, agronomy, entomology and horticulture emphasizing the principles of effective plant disease management in the agroecosystem.
Credit Only Granted for: AGRO802, NRSC802, or PLSC802.
Formerly: NRSC802.

PLSC805 Advanced Crop Physiology (2 Credits)
Major emphasis will be on physiological processes affecting yield and productivity of major food fiber and industrial crops of the world. Topics such as photosynthesis, respiration, photorespiration, nitrogen metabolism will be related to crop growth as affected by management decisions. Topics of discussion will also include growth analysis and the use of computer modeling of crop growth by plant scientists.
Prerequisite: BSCI442; and must have completed advanced training in plant sciences.
Credit Only Granted for: NRSC805 or PLSC805.
Formerly: NRSC805.

PLSC898 Pre-Candidacy Research (1-8 Credits)

PLSC899 Doctoral Dissertation Research (1-8 Credits)

PORT - Portuguese

PORT405 Portuguese for Spanish Speakers (3 Credits)
Intensive basic grammar, reading and auditory comprehension. Native or acquired fluency in Spanish required.
Restriction: Must have native or acquired fluency in Spanish.

PORT408 Special Topics in Portuguese Literature (3 Credits)
Major themes and literary developments from the late 18th century to the present.
Repeatable to: 6 credits if content differs.

PORT409 Special Topics in Brazilian Literature (3-6 Credits)
Major themes and literary development from the late eighteenth century to the present. Specific topic to be announced each time the course is offered.

PORT478 Themes and Movements of Luso-Brazilian Literature in Translation (3 Credits)
A study of specific themes and movements either in Portuguese or Brazilian literature, as announced. Designed for students for whom the literatures would be inaccessible in Portuguese.
Repeatable to: 6 credits if content differs.

PORT480 Machado de Assis (3 Credits)
Fiction of Machado de Assis covering his romantic and realistic periods.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.

PORT609 Special Topics - Brazilian Literature (3-6 Credits)
Representative topics/authors/works of Brazilian literature. Texts in Portuguese: classes conducted in Portuguese and Spanish.
Prerequisite: Must have reading knowledge of Portuguese - fluency in Spanish or Portuguese.
Repeatable to: 6 credits if content differs.

PORT699 Independent Study of Portuguese (1-3 Credits)
This course is designed to provide graduate students an opportunity to pursue independent study under the supervision of a member of the department.
Repeatable to: 3 credits.

PSYC - Psychology

PSYC401 Biological Bases of Behavior Laboratory (4 Credits)
Students will study some of the key concepts in neuroscience by combining behavioral experiments with electrode recordings from neurons controlling the behaviors. We will intensively examine concepts like creation of rhythmic behaviors (walking, flight), neurotransmitters' control of aggression, drug effects on synaptic activity, high-speed neural circuits for effective escape from predators, and CNS maps in the visual system for directing prey capture. Students will learn microsurgery and a broad range of neural recording techniques. We work with animals (invertebrates, cold-blooded vertebrates) every week. A strong biology background will be beneficial.
Prerequisite: PSYC300; and (PSYC202, NEUR200, or BSCI353).
Restriction: Permission of instructor; and must be in Psychology program; and must have earned a minimum of 85 credits.

PSYC403 Animal Behavior (3 Credits)
Reviews the theoretical framework underlying the study of animal behavior. The genetic, hormonal and physiological basis of behavior, and the relation to ecological and evolutionary processes will be discussed using examples that range from invertebrate animals to humans.
Prerequisite: PSYC202 or NEUR200.

PSYC404 Introduction to Behavioral Pharmacology (3 Credits)
Theoretical viewpoints on the interaction of drugs and behavior. Basic principles of pharmacology, the effects of drugs on various behaviors, experimental analysis of drug dependence and abuse, and neuropharmacology and behavior.
Prerequisite: PSYC202 or NEUR200.
Restriction: Must be in Psychology program.

PSYC406 Neuroethology (3 Credits)
A merger between the disciplines of neuroscience and ethology (animal behavior) studies the behavioral functions of nervous systems using a comparative and evolutionary approach. Students will learn how the nervous system controls behavioral patterns in a variety of different organisms ranging from insects to mammals.
Prerequisite: PSYC301, PSYC202 or NEUR200.
Restriction: Must be in Psychology program.

PSYC407 Behavioral Neurobiology Laboratory (4 Credits)
How does the nervous system control behavior? We will address this question using simple behavioral experiments combined, in some exercises, with microsurgery and electrode recordings in the nervous system. Concepts studied will include CNS plasticity, the role of proprioception in controlling movement, cortical processing and myth multitasking, sensory resolution by measuring receptive field sizes, activity of simple neural circuits controlling escape from predators, and the effects of neuromodulators on aggression. Animals used are all invertebrates.
Prerequisite: PSYC300; and (PSYC202 or NEUR200).
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits.

PSYC409 Topics in Neurosciences Seminar (1 Credit)
Current research in neurosciences will be presented, read, and discussed. Emphasis will change each term.
Restriction: Permission of BSOS-Psychology department; and junior standing or higher.
Repeatable to: 4 credits if content differs.

PSYC411 Introduction to Functional Magnetic Resonance Imaging (3 Credits)
An introduction to functional magnetic resonance imaging (fMRI). Students will be taught about formulating testable hypotheses with fMRI, utilizing basic methods in fMRI studies, and understanding existing limitations of fMRI studies in the literature.
Prerequisite: PSYC200 and PSYC300; and (PSYC202 or NEUR200).
Restriction: Must be in a major within BSOS-Psychology department.
Credit Only Granted for: NACS728F or PSYC411.

PSYC414 Science of Sleep and Biological Rhythms (3 Credits)
Sleep is a powerful, inescapable, misunderstood, and mysterious presence in our lives. The course will begin with a review of the basics of sleep and biological rhythms with a focus on the underlying neurobiology. The bulk of the semester will be in-depth discussions of topics in sleep and circadian rhythms primarily chosen by the students. A few examples: narcolepsy, sleep in primitive cultures, lucid dreaming, racial and cultural differences in sleep and sleep disorders, the biology of sleep and circadian rhythms during adolescence, CNS control of dreaming, sleep and states of consciousness, sleeping to remember vs. sleeping to forget, legal ramifications of parasomnias, e.g. sleepwalking, and the relationships between sleep deprivation and obesity.
Prerequisite: PSYC301, PSYC202, or NEUR200; or permission of instructor.
Restriction: Must be in a major within the BSOS-Psychology department; and restricted to psychology majors during the registration period.

PSYC416 Development of Attachment in Infancy and Childhood: Theory, Research, Methods, and Clinical Implications (3 Credits)
Overview of the development of attachment during infancy and childhood, examining theory, research methods, research findings, and clinical implications. Students will observe videos of attachment assessments, lead class discussion of readings, make class presentations, and complete writing assignments.
Prerequisite: PSYC355; or permission of instructor.
Restriction: Must be in a major within the BSOS-Psychology department.

PSYC417 Data Science for Psychology and Neuroscience Majors (4 Credits)
A large number of industry and academic jobs require basic programming and data analysis skills. This class represents an introduction to both. Students will learn to program in R and will briefly be introduced to Python, the two most popular programming languages for data science. Common constructs shared by a variety of procedural programming languages will be emphasized. Basic statistics and probability theory will be reviewed from a computational perspective, and more advanced topics introduced. During the course, students will simulate toy data sets which they will then analyze knowing how the data came about, as well as work with real data. The class is highly hands-on with a large number of in-class lab and homework projects. Expect to work a lot and move quickly. Because of the hands-on nature of the class, the overall focus is more on application and execution rather than theory. However, some theory is covered at a high level so that students are aware of why they are doing something, rather than mindlessly writing code.
Prerequisite: PSYC200 and PSYC300; and (MATH120, MATH130, or MATH140).
Credit Only Granted for: PSYC489D or PSYC417.
Formerly: PSYC489D.

PSYC420 Experimental Psychology: Social Psychology Laboratory (4 Credits)
A laboratory course to provide a basic understanding of experimental methods in social psychology and experience in conducting research on social processes.
Prerequisite: PSYC300 and PSYC221.
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits.

PSYC424 Communication and Persuasion (3 Credits)
Effect of social communication upon behavior and attitudes. Theory and research concerning attitude change and social influence.
Prerequisite: PSYC221 and PSYC200.

PSYC425 Psychology and Law (3 Credits)
An introduction to the intersection of psychology and the criminal justice system, known as the field of legal psychology. The material covered will span the course of the criminal justice process and examine each aspect from a psychological perspective beginning with profiling and moving on to eyewitness memory and judgements through perpetrator memories and interrogation techniques. These aspects will be evaluated with a research lens as well as an applied outlook.
Prerequisite: PSYC100, PSYC200, and PSYC300.
Restriction: Must be in Psychology program.
Credit Only Granted for: PSYC325, or PSYC425.

PSYC432 Counseling Psychology: Theories, Research, and Practice (3 Credits)
Analysis of research and intervention strategies developed and used by counseling psychologists. Historical and current trends in content and methodology.
Prerequisite: PSYC200.

PSYC433 Basic Helping Skills: Research and Practice (4 Credits)
Theories and research regarding effective helping relationships, with a focus on applications to counseling and psychotherapy. Students will practice helping skills with each other and will conduct research projects evaluating their helping skills. Students should be willing to talk about personal issues in class. Attendance in labs is mandatory and contributes to the course grade; thus, students should only enroll in a lab section that they will be able to attend consistently.
Prerequisite: PSYC300.
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits; and must not have completed or be concurrently enrolled in EDCP 310.
Credit Only Granted for: EDCP210, EDCP310, or PSYC433.

PSYC435 Temperament, Personality, and Psychopathology (3 Credits)
An advanced review of cutting-edge research in humans and animals aimed at understanding the psychological and biological mechanisms underlying stable individual differences in temperament and personality (T&P) and determining their role in adult and child psychopathology, with a major focus on anxiety disorders, depression, and addiction. We will discuss the developmental origins of T&P, measurement issues, fundamental dimensions, heritability, relevance to psychopathology and intervention (treatment and prevention), and broader implications for public policy.
Prerequisite: PSYC200.

PSYC436 Introduction to Clinical Psychology: From Science to Practice (3 Credits)
Critical analysis of clinical psychology, with particular emphasis on current developments and trends.
Prerequisite: PSYC300.

PSYC437 The Assessment and Treatment of Addictive Behaviors (3 Credits)
Explores the current research in assessment and treatment of addictive behaviors. Topics may include addictions in the areas of alcohol, drugs, nicotine, gambling, and eating.
Prerequisite: PSYC100; and 9 credits in PSYC courses.

PSYC438 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

PSYC440 Experimental Psychology: Cognitive Processes and Legal Applications (4 Credits)
A survey of the content, models, and methods in cognitive psychology with an emphasis on attention and encoding, recall, recognition, judgment, signal detection theory, and applying cognitive theories to situations in the legal system. Students integrate scientific theories with real-life legal situations. Course topics include research methodology in assessing and addressing cognitive mechanisms and how this understanding may help eyewitness and victim recall and recognition, perpetrator recall, assessing scientific theories of repression, and real life examples.
Prerequisite: PSYC100, PSYC200, PSYC300 and PSYC341.
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits.

PSYC442 Psychology of Language (3 Credits)
Introductory survey of the psychology of language, focusing on the cognitive processes that enable us to produce and understand language. Topics include speech perception, speech production, syntactic processing, language development, language disorders, and the brain bases of language.
Prerequisite: PSYC300 and PSYC341.
Restriction: Must be in Psychology program.

PSYC444 Cyberpsychology: The Psychology of Human/Computer Interactions (3 Credits)
Explores traditional psychological processes in the rapidly changing world of computer and internet technologies. Students will address how the use of computers impacts many of the major topics in psychology.
Prerequisite: PSYC200.
Credit Only Granted for: PSYC309E or PSYC444.
Formerly: PSYC309E.

PSYC445 The Psychology of Video Games and Entertainment (3 Credits)
An exploration of the diverse elements and theories in the psychology of video games and entertainment. The history and taxonomy of video games, cognitive and affective elements, virtual reality and social presence, video game violence, and educational and ethical issues will be covered.
Prerequisite: PSYC200.
Restriction: Must be in Psychology program; or permission of BSOS-Psychology department.
Credit Only Granted for: PSYC309V or PSYC445.
Formerly: PSYC309V.

PSYC447 Diversity in Organizations (3 Credits)
Overview and active discussion of issues related to diversity and discrimination in organizations from several different perspectives, including: the person(s) being stigmatized, the person(s) doing the stigmatizing, the bystander(s) witnessing stigmatization of others, and the organization. Course readings address each of these perspectives, along with an introductory unit that outlines key concepts of diversity.
Prerequisite: PSYC300.
Credit Only Granted for: PSYC489E or PSYC447.
Formerly: PSYC489E.

PSYC450 Applying Psychology to the Workplace: Industrial Organizational Psychology Laboratory (4 Credits)
In this laboratory course, students use data analytic techniques, along with psychology theories and principles, to solve problems and provide recommendations to mock organizations. Along with learning theories in industrial-organizational psychology and statistical analysis, students will improve personal presentation skills that promote effective communication of information.
Prerequisite: PSYC300.

PSYC455 Cognitive Development (3 Credits)
Theory and research on cognition from a developmental perspective. This discussion-based seminar will emphasize readings on infancy through early childhood. Topics will include general abilities such as memory and categorization, as well as children's emerging knowledge about the physical and social worlds.
Prerequisite: PSYC300; and PSYC355. Or permission of instructor.
Restriction: Must be in Psychology program.

PSYC456 Research Methods in Developmental Psychology Laboratory (4 Credits)
A presentation of major research designs used in developmental psychology and of the methodology used in developmental research, such as observational research, program evaluation, and laboratory experimentation.
Prerequisite: PSYC300; and permission of BSOS-Psychology department.
Restriction: Must be in Psychology program; and must have earned a minimum of 85 credits.

PSYC460 Psychological Foundations of Personnel Selection and Training (3 Credits)
An examination of issues and processes involved in the design and evaluation of personnel selection and training programs in a variety of organizational settings: job, person and organizational analysis; organizational choice; development of predictors; evaluation of instructional and training systems; criteria for performance evaluation, promotion and training.
Prerequisite: PSYC361 and PSYC200.

PSYC464 Psychology of Leaders in Work Organizations (3 Credits)
The psychological assumptions and implications of various theories of management and leadership. Selections and training; development of careers; influence processes; change of managerial behavior; and the impact of the larger environment, nature of product or service, and organization structure on managerial behavior.
Prerequisite: PSYC200 and PSYC361.

PSYC468 Field Experience and Special Assignments in Honors (1-3 Credits)
An individual experience arranged by the honors student and his or her supervisor. A proposal submitted to the honors faculty in the semester preceding registration for the course should state the activities anticipated and the method of evaluation.
Prerequisite: Must have permission of supervisor and honors faculty.
Restriction: Permission of BSOS-Psychology department.
Repeatable to: 6 credits.

PSYC469 Honors Thesis Proposal Preparation (3 Credits)
Development of honors thesis proposal by preliminary research and literature review. Presentation of formal proposal to the thesis committee.
Restriction: Permission of BSOS-Psychology department.
Repeatable to: 3 credits.

PSYC478 Independent Study in Psychology (1-3 Credits)
Restriction: Permission of BSOS-Psychology department; and must have earned a minimum of 9 credits in Psychology; and must have earned a minimum GPA of 3.0 in Psychology; and minimum cumulative GPA of 2.8.
Repeatable to: 9 credits.

PSYC479 Special Research Problems in Psychology (1-3 Credits)
Restriction: Permission of BSOS-Psychology department; and must have earned a minimum of 9 credits in Psychology; and must have earned a minimum GPA of 3.0 in Psychology; and minimum cumulative GPA of 2.8.
Repeatable to: 9 credits.

PSYC488 Advanced Psychology I (Honors) (3 Credits)
Seminar covering topics in sensation, perception, learning, and motivation.
Prerequisite: PSYC200.
Restriction: Permission of BSOS-Psychology department.

PSYC489 Advanced Special Topics in Psychology (3 Credits)
Treatment of a specialized topic in psychology.
Prerequisite: PSYC300.
Repeatable to: 9 credits if content differs.

PSYC498 Advanced Psychology II (Honors) (1 Credit)
Seminar covering topics of current interest in psychology.
Prerequisite: Permission of BSOS-Psychology department.
Repeatable to: 3 credits.

PSYC499 Honors Thesis Research (3 Credits)
Prerequisite: PSYC469; and must have permission of thesis advisor.

PSYC601 Quantitative Methods I (4 Credits)
A basic course in quantitative/mathematical analysis and statistical methods in psychology with an emphasis on conceptual understanding. Topics include issues in measurement, probability theory, statistical inference and hypothesis testing, parameter estimation, bivariate regression, and correlation.
Prerequisite: PSYC200; or students who have taken courses with comparable content may contact the department.

PSYC602 Quantitative Methods II (4 Credits)
A continuation of PSYC 601. Topics include experimental design, analysis of variance, analysis of covariance, multiple regression, and general linear models.
Prerequisite: PSYC601.

PSYC603 Introduction to Industrial and Organizational Psychology (3 Credits)
Advanced survey of industrial-organizational psychology, including selection, training, motivation, group processes, leadership, organizational psychology, and organizational theory. Readings stressed and seminar time will be used for lectures, discussion and integration of the reading materials.
Credit Only Granted for: PSYC603 or PSYC730.
Formerly: PSYC730.

PSYC604 Fundamentals of Social Psychology (3 Credits)
A survey of classic and contemporary theories, research and methods in social psychology.
Credit Only Granted for: PSYC604 or PSYC640.
Formerly: PSYC640.

PSYC606 Human Biopsychology (3 Credits)
An introductory graduate level course in human psychobiology designed for graduate students with little specific training in this area. Introduction to the comparative and evolutionary approach to the study of human behavior, the biobehavioral basis of human sexuality and social behavior, the physiological basis of higher cortical functions in humans including language, memory, and spatial perception, and an introduction to neuropharmacology.
Credit Only Granted for: PSYC606 or PSYC660.
Formerly: PSYC660.

PSYC607 Advanced Topics in Human-Learning and Cognitive Psychology (3 Credits)
A systemic review of major topic areas in the field of human learning and cognition, with emphases on information processes, mental representations, memory, reasoning, problem solving, and language.
Credit Only Granted for: PSYC607 or PSYC671.
Formerly: PSYC671.

PSYC610 Historical Viewpoints and Current Theories in Psychology (3 Credits)
Origins of psychology in philosophy and the sciences; the development of psychology as a science in the nineteenth and twentieth centuries. A review of current theoretical perspectives and research in relation to the enduring issues in psychology. The role of culture, science, and technology in the development of psychological ideas.
Credit Only Granted for: PSYC610 or PSYC688.
Formerly: PSYC688.

PSYC611 Advanced Developmental Psychology (3 Credits)
Systematic exploration of contemporary and classic theories of development focusing on the assumptions they make and research they generate.

PSYC612 Affective Science Perspectives on Temperament & Personality (3 Credits)
Scientific requirements for a personality theory. Postulates and relevant research literature for several current personality theories.

PSYC614 Emotion: From Biological Foundations to Contemporary Debates in the Psychological Sciences (3 Credits)
Multidisciplinary exploration of the current state of our scientific understanding of emotional states and traits, their biological roots, and their relevance to psychiatric disease. We will cover foundational knowledge in neuroscience and genetics, strengths and weaknesses of widely used methods, classic and cutting-edge empirical work, and ongoing conceptual debates. We will also discuss crucial discrepancies between the ways in which scientists and laypeople conceptualize emotions. In addition to human neuroimaging and genomic-association studies, we will explore biological research that affords causal insights, including animal models, acute pharmacological challenges, neurofeedback, and brain stimulation approaches, and case studies of patients with circumscribed neural insults.

PSYC619 Research Team in Clinical Psychology (1-3 Credits)
Participation in ongoing faculty-student research teams focusing on discussion of research topics, presentation and critique of original research proposals, and development of thesis and dissertation research studies.
Repeatable to: 6 credits.

PSYC622 Research Methods in Clinical Psychology (3 Credits)
Examines issues and strategies in conceptual systems, designs and methodologies of current research in clinical and community psychology. Readings include critical analyses of published research. Course requirements include preparation of a research proposal for a thesis level study.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC622 or PSYC718.
Formerly: PSYC718.

PSYC623 Child Psychopathology (3 Credits)
Examines the scientific and clinical literature relevant to normal and pathological behavior in children and adolescents. Issues in developmental psychopathology and consideration of processes initiated in childhood which manifest as pathology in adulthood are also considered.
Restriction: Permission of instructor; and must be in one of the following programs (Psychology (Master's); Psychology (Doctoral)).

PSYC624 Adult Psychopathology (3 Credits)
Examines the scientific and clinical literature relevant to normal and pathological behavior in adults and associated nosological systems for categorizing psychopathology. Issues relevant to etiology, differential diagnosis, and treatment planning are also considered.
Restriction: Permission of instructor; and must be in one of the following programs (Psychology (Master's); Psychology (Doctoral)).
Credit Only Granted for: PSYC624 or PSYC719.
Formerly: PSYC719.

PSYC625 Clinical Assessment: Psychometric Principles, Testing and Behavior (3 Credits)
An examination of fundamental principles of psychological assessment; application of these principles to the development of evidence-based assessments of clinical conditions and associated behaviors; and application of evidence-based assessments to the evaluation and understanding of clinical conditions evaluated and treated in therapeutic settings.
Restriction: Permission of BSOS-Psychology department.
Credit Only Granted for: PSYC625 or PSYC721.
Formerly: PSYC721.

PSYC628 Advanced Topics in Clinical Psychology (1-3 Credits)
Examines selected topics in clinical/community psychology, public policy and health care planning.
Restriction: Permission of instructor.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: PSYC628 or PSYC719.
Formerly: PSYC719.

PSYC629 Clinical Laboratory (1-3 Credits)
Provides advanced supervised experience in the delivery and supervision of mental health interventions targeted to individuals. Supervised work with clients is required.
Repeatable to: 15 credits.
Credit Only Granted for: PSYC629 or PSYC632.
Formerly: PSYC632.

PSYC630 Behavioral and Cognitive Behavioral Intervention for Adults (3 Credits)
Introduces students to the process of therapy with particular focus on behavioral focus on behavioral and cognitive behavioral internentions. Syllabus focuses on theory, research, client diversity, ehtics, and practical aspects of conducting therapy.
Prerequisite: PSYC680.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC630 or PSYC728.
Formerly: PSYC728.

PSYC632 Behavioral and Cognitive Behavioral Intervention for Children and Adolescents (3 Credits)
Introduces students to the process of therapy with particular focus on behavioral and cognitive behavioral interventions in children and adolescents. Syllabus focuses on theory, research, client diversity, ethics and practical aspects of conducting therapy.
Restriction: Permission of instructor; and must be in one of the following programs (Psychology (Master's); Psychology (Doctoral)).
Formerly: PSYC789A.

PSYC638 Externship in Professional Psychology (1-3 Credits)
Approved appointment as an extern in a mental health setting.
Repeatable to: 6 credits if content differs.

PSYC639 Internship in Professional Psychology (1 Credit)
This seminar combines involvement with a program approved appointment as an intern in a mental setting with a supervisory review of the training experience.
Repeatable to: 6 credits if content differs.

PSYC642 Biological Considerations in Clinical Psychology (3 Credits)
Behaviors are based partially in the bilogy of the human organism. This course begins with an examination of the nature-nurture issue on psychology, particularly as it applies to clinical psycology. Genetic underpin nings of behavior their neuroanatomical neurochemical expressions will be explored. This course will also examine psychopsychiological meas ures and the role of psychoparmacology and other biological interventions in treatment.

PSYC643 Ethics and Foundations of Assessment and Clinical Intervention (3 Credits)
An overview of the ethical and professional issues involved in psychological research, instruction, and practice, with special attention to advocacy and ethical decision making regarding a variety of primary, secondary, and tertiary clinical/community interventions.
Restriction: Permission of instructor; and must be in one of the following programs (Psychology (Master's); Psychology (Doctoral)).
Credit Only Granted for: PSYC643 or PSYC719.
Formerly: PSYC719.

PSYC644 Basic Foundation of Clinical Interventions (3 Credits)
General introduction to behavior theory and the basic behavioral principles that underlie behavior therapy. Provides an introduction to the philosophical, theoretical and empirical contributions of basic behavior analysis as they relate to behavior therapy, including examples of how behavior therapy is disconnected from its roots.
Restriction: Permission of instructor; and must be in one of the following programs (Psychology (Master's); Psychology (Doctoral)).

PSYC650 Culture and Diversity in Mental Health (3 Credits)
Review literature regarding the role of culture and diversity in mental health and how culture and diversity are integrated into research and are related to mental health and mental health service utilization. Examine principles and concepts of multicultural and cross-cultural psychology to acquire an increased understanding of diverse underrepresented groups and topics to consider when involved with research and/or clinical work with individuals having diverse backgrounds (e.g., cultures, ethnicities, genders, sexual orientations, and socioeconomic status).
Restriction: Must be enrolled in the Clinical Psychological Science MPS program.

PSYC651 Writing and Critical Thinking (3 Credits)
A capstone experience to integrate knowledge learned throughout the program and improve critical thinking and research writing skills. This will be done through the production of a major research paper in an area relevant to the current or future career goals of the student and by emphasizing critical thinking skills.
Restriction: Must be enrolled in and have successfully completed all courses in the first 4 terms of the Clinical Psychological Science MPS program.

PSYC652 Analytical Thinking: Statistical Methods at Work (3 Credits)
Personal and organizational growth begins with asking and answering great questions. Correspondingly, this course begins with demonstrations of how to translate business questions into research questions. Statistical methods used to answer business questions are taught first conceptually, then computationally using statistical software. This course emphasizes interpreting results, the regression model, and other issues salient to business research, such as handling large datasets. Students will be provided with a simulated dataset that they will use in learning how to frame and answer business questions using the techniques covered in this course. At the conclusion of this course, students will be required to provide an executive-level presentation on the business question, their findings, and resulting implications.
Additional Information: Students will be taught how to conduct analyses in R, SPSS, SAS, Stata, and excel; students are encouraged to practice analyses on at least two of these programs.

PSYC653 The Business of Evaluation: Research Methods at Work (3 Credits)
Students will learn about the strengths and weaknesses of commonly employed research methods in business settings, including: longitudinal research, survey and interview (including focus groups) design, and sampling and weighting. Students will design and launch a research study that will answer a pressing business question.
Prerequisite: PSYC652.
Additional Information: Course builds from work completed in PSYC 652. Students are also expected to commit to a two-term long project. Students will work with a non-profit organization or local business to ask and answer a business question for the organization. Students will conclude this project in PSYC 654.

PSYC654 Advanced Analytical Thinking: Statistical Methods at Work II (3 Credits)
Students will delve deeply into issues of interpreting and questioning analytic results. Students will learn how to creatively present empirical results in ways that grab the attention of, and are clear to, a variety of stakeholders. Students will present group projects in two presentations, one to the rest of the class (technical audience) and one to an expert panel of practitioners. Finally, this course will introduce students conceptually to a number of advanced statistical methods, such as meta-analysis and structural equation modeling.
Prerequisite: PSYC652 and PSYC653.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC655 Talent Development (3 Credits)
In this course, students will learn how to design and implement effective employee training programs as well as how to encourage informal learning in organizations. This course will review current theories in adult learning (e.g., ADDIE model, action learning, peer feedback/coaching), several popular assessment tools (e.g., MBTI), and best practices for evaluating training programs. Issues relevant to leadership identification and development, including succession planning, will also be covered. As part of this course, students will work in teams to design and deliver a brief training module and practice giving and receiving feedback. Additionally, students will complete, and facilitate a debriefing on, a 360-degree feedback assessment.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC656 Business Fundamentals and Legal Issues facing Organizations (3 Credits)
This course provides an overview of the fundamentals of business, including both issues of finance and legal issues faced by organizations. Topics will include finance, accounting, and marketing. Students will learn core business concepts, about how each major business function enables organizations to run, and how to talk to and understand the leaders of organization. Additionally, this course will provide an overview of common legal challenges organizations face. In addition to introducing students to employment law, this course will review professional ethics standards for IO psychology. This course will use case study methodology to hone students' understanding of the ethical and legal issues faced in day-to-day organizational life.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC657 Managing Strategic Organizational Change (3 Credits)
In this course, students will learn to think about organizations as systems and will explore catalysts of organizational change. Issues of strategy, market pressure, competition, workforce planning, and stakeholder buy-in will be discussed. Finally, students will learn about methods for planning, leveraging, and managing organizational change. Case study methodology will be used to deepen learning on the challenges faced during organizational change and how to guide organizations through change, planned or not.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC660 Performance Management, Compensation, and Benefits (3 Credits)
This course draws together content on organizational behavior, selection, assessment, development, employee relations, and compensation, among other topics. Students in this course will learn about how to align organizational reward systems, including selection, development, performance appraisal, feedback, and compensation systems. This course will pull from current organizational research and theory on issues ranging from work motivation, employee retention, and feedback processes to issues of organizational strategy and culture.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC661 Practicum in IO Psychology (3 Credits)
In this practicum, students will work on IO-related tasks in an organization and will have the opportunity to apply what they have learned in class to real-world problems. Students will write a reflection paper reviewing what skills they have applied - and developed - while completing this practicum.
Prerequisite: PSYC603, PSYC652, PSYC653, and PSYC654.
Restriction: Must be in the Master of Professional Studies in Industrial/Organizational Psychology Program.

PSYC662 Understanding Trauma and Recovery I (3 Credits)
This course is designed to provide students with an overview of psychological trauma and an introduction to treatment of trauma survivors. Current theoretical approaches to understanding trauma and treatment from psychological, developmental, neurobiological, cognitive, and ecological perspectives will be presented.
Restriction: Must be in the Graduate Certificate of Professional Studies in Treating Survivors of Violence, Torture, and Trauma: Theoretical Foundations and Mental Health; or permission of instructor.

PSYC663 Understanding Torture and Trauma I (3 Credits)
The focus of this course is to provide students with an introduction to the psychology of torture survivors. Students will discuss theoretical approaches to understanding of torture, think critically about the context of torture, and understand the psychological, social/familial, spiritual, physical, community, and political implications of torture. Interventions for working with torture survivors will be introduced.
Restriction: Must be in the Graduate Certificate of Professional Studies in Treating Survivors of Violence, Torture, and Trauma: Theoretical Foundations and Mental Health; or permission of instructor.

PSYC664 Understanding Trauma and Recovery II (3 Credits)
This is the second in a series of two courses designed to provide students with an understanding of psychological trauma and treatment of trauma survivors. Current approaches to understanding and treating trauma survivors from psychological, developmental, neurobiological, cognitive, and ecological perspectives will be presented.
Prerequisite: PSYC662.
Restriction: Must be in the Graduate Certificate of Professional Studies in Treating Survivors of Violence, Torture, and Trauma: Theoretical Foundations and Mental Health; or permission of instructor.

PSYC665 Understanding Torture and Trauma II (3 Credits)
This is the second course in a searies of two classes focused on theory, research, and psychological interventions related to the treatment of survivors of torture and trauma. Current approaches to treatment of torture survivors, as well as psychological, social/familial, spiritual, physical, community, and political implications of torture will be introduced.
Prerequisite: PSYC663.
Restriction: Must be in the Graduate Certificate of Professional Studies in Treating Survivors of Violence, Torture, and Trauma: Theoretical Foundations and Mental Health; or permission of instructor.

PSYC669 Professional Issues in Counseling Psychology (1 Credit)
Introduction to counseling psychology, including history and development of the field, and current professional and scientific issues. Exploration of career, research, and professional development opportunities.
Restriction: Must be in the Counseling Psychology program.
Repeatable to: 3 credits if content differs. Cross-listed with EDCP669.

PSYC672 Introduction to Addiction and Co-occurring Conditions (3 Credits)
An in-depth overview of the range of addictive behaviors and the psychological conditions that often co-occur and complicate the presentation and course of addictive behaviors.
Restriction: This course is reserved for students enrolled in the Graduate Certificate Program in Addiction Science and Intervention.

PSYC678 Seminar in Psycholinguistics (3 Credits)
Contemporary psycholinguistic theories of language acquisition and use. Phonological, semantic and syntactic aspects of language.
Prerequisite: PSYC671.
Repeatable to: 6 credits.

PSYC679 Seminar in Cognitive Development (3 Credits)
Advanced coverage of research methodology and research issues in various areas of cognitive development such as categorization, spatial understanding, language acquisition, and memory. Emphasis on interrelationships among developmental changes across the life-span. Utility of a developmental perspective in analyzing the components of cognition.
Prerequisite: PSYC611 or PSYC671.
Repeatable to: 6 credits.

PSYC682 Counseling Psychology Didactic-Practicum in Group Interventions (3 Credits)
In depth examination of theories and techniques of group interventions, and supervised experience in group counseling.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC682 or PSYC729.
Formerly: PSYC729.

PSYC683 Counseling Psychology Didactic-Practicum in Couples and Family Interventions (3 Credits)
In depth examination of theories and techniques of couples and family counseling, and supervised experience in couples/family counseling.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC683 or PSYC729.
Formerly: PSYC729.

PSYC688 Ethicial and Legal Issues in Counseling Psychology (1 Credit)
Exploration of ethical standards and legal issues in the profession of counseling psychology.
Restriction: Must be in the Counseling Psychology program.
Repeatable to: 3 credits if content differs.

PSYC689 Seminar in Counseling Psychology (3 Credits)
Special topics in counseling psychology. Examples of topics include multi-cultural counseling, the counseling relationship, counseling and victimology, psychological treatment and health.
Restriction: Permission of instructor.
Repeatable to: 12 credits if content differs.
Credit Only Granted for: PSYC689 or PSYC719.
Formerly: PSYC719.

PSYC690 Research in Counseling Psychology I (3 Credits)
Critical analysis of strategies methodological, conceptual, and content trends.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC690 or PSYC718.
Formerly: PSYC718.

PSYC691 Research in Counseling Psychology II (3 Credits)
Critical analysis of trends and issues in counseling psychology science.
Restriction: Permission of instructor.
Credit Only Granted for: PSYC691 or PSYC718.
Formerly: PSYC718.

PSYC692 Assessment in Counseling Psychology I (3 Credits)
Broad introduction to the construction of psychological tests and measures, and experience in test interpretation, with consideration of historical, legal, ethical, and cultural issues surrounding the assessment process.
Prerequisite: PSYC680.
Credit Only Granted for: PSYC692 or PSYC721.
Formerly: PSYC721.

PSYC695 Ethical and Professional Issues in Counseling Psychology (3 Credits)
Exploration of ethical and professional issues in Counseling Psychology.
Restriction: Must be in the Counseling Psychology program. Also offered as: EDCP695.
Credit Only Granted for: EDCP669, EDCP688, EDCP695, PSYC688, or PSYC695.
Formerly: EDCP669 and EDCP688.

PSYC698 Advanced Didactic Practicum in Counseling Psychology (3 Credits)
In depth examination of approaches to or theories abouth intervention, and supervised experience in the application of those approaches or theories. Each practicum focuses on a particular approach, e.g., psychodynamic, cognitive-behavioral, cross-cultural.
Prerequisite: For Counseling Psychology majors only.
Repeatable to: 12 credits if content differs. Cross-listed with: EDCP698.
Formerly: EDCP776.

PSYC699 Diversity and Multiculturalism in Counseling Psychology (1 Credit)
Exploration of knowledge, attitudes, and skills for providing counseling psychological services to culturally diverse populations.
Restriction: Must be in the Counseling Psychology program.
Repeatable to: 3 credits if content differs.
Formerly: EDCP696.

PSYC700 Theories and Strategies of Counseling Psychology (3 Credits)
Introduction to the professional field, examination of pertinent scientific and philosophical backgrounds, and survey of the major theories, principles, and training models in counseling. Correlated laboratory analogue experiences in dyadic and group interrelationships.
Restriction: Permission of BSOS-Psychology department.
Credit Only Granted for: PSYC700 or PSYC711.
Formerly: PSYC711.

PSYC707 Theory of Decision and Choice (3 Credits)
A study of algebraic and probabilistic models for decision and choice behavior, and related experimental procedures. Topics include: measurement of preference, subjective utility models for certain and uncertain outcomes, normative strategies, decision making styles, and group decision making.
Prerequisite: PSYC602.
Restriction: Permission of instructor.

PSYC708 Seminar in Psychometric Theory (3 Credits)
Study of the current practices, trends, or recent developments in psychometric theory.
Prerequisite: PSYC602; or permission of instructor.
Repeatable to: 9 credits if content differs.

PSYC709 Seminar in Mathematical Models (3 Credits)
Special topics in mathematical psychology. A discussion of quantitative representations of psychological processes in one or more substantive areas of psychology.
Prerequisite: PSYC602; or permission of instructor.
Repeatable to: 9 credits if content differs.

PSYC725 Teams at Work (3 Credits)
Theory and research regarding the formation, management, and functioning of teams in the workplace; including team composition, team rewards, team-task and team-organization relationships and fit, team productivity, and the selection for and training of teams. International use of teams at work.
Prerequisite: PSYC602; or permission of instructor.
Credit Only Granted for: PSYC725 or PSYC747.
Formerly: PSYC747.

PSYC732 Selection and Classification Issues in Organizations (3 Credits)
Consideration of societal, organizational and individual demands for appropriate use of individual differences in (primarily) initial placement of employees. Recruitment, and selection issues, the role of governmental regulations, and the role of individual factors in individual behavior are considered. Extensive coverage given to fundamental psycho-metric problems and the development of individual and organizational criteria of effectiveness.
Prerequisite: PSYC603; and (PSYC602; or students who have taken courses with comparable content may contact the department). Or permission of instructor.

PSYC737 Research Methods in Industrial/Organizational Psychology (3 Credits)
Philosophy, theory, and method issues underlying I/O psychology. History and the effectiveness of different methods for answering different questions is explored. Reliability and validity are emphasized.
Prerequisite: PSYC603; or permission of instructor.

PSYC738 Seminar in Industrial/Organizational Psychology (3 Credits)
An occasional advanced seminar covering specialized topics.
Prerequisite: PSYC603; or permission of instructor.
Repeatable to: 99 credits if content differs.

PSYC739 The Psychology of Workplace Change and Innovation (3 Credits)
Organizational change and innovation research and theory, current impetuses for organizational change (e.g., economic, demographic, and technological trends) and specific workplace innovations (e.g., employee ownership, QWL, CAD/CAM, etc.)
Prerequisite: PSYC603; or permission of instructor.

PSYC748 Seminar in Social Psychology (3 Credits)
A seminar on selected topics in social psychology.
Repeatable to: 15 credits if content differs.

PSYC749 Current Research in Social Psychology (1-3 Credits)
Repeatable to: 12 credits if content differs.

PSYC757 Developmental Cognitive Neuroscience (3 Credits)
Developmental cognitive neuroscience investigates the relations between neural and cognitive development. This course provides an overview of current research questions, methodologies and findings related to neurocognitive development in human infants and children, the role of developmental plasticity, and atypical outcomes, such as those observed in neurodevelopmental disorders.
Restriction: Must be in one of the following programs (Psychology (Master's); Psychology (Doctoral); Neurosciences and Cognitive Sciences (Doctoral)) ; or permission of BSOS-Psychology department.
Credit Only Granted for: NACS728D or PSYC757.

PSYC758 Seminar in the Neural Bases of Sensory Processes (3 Credits)
Selected topics in vision and the other senses.
Prerequisite: PSYC605; or permission of instructor.
Repeatable to: 9 credits if content differs.

PSYC759 Seminar in Neural Bases of Perceptual Processes (3 Credits)
Selected topics in perceptual phenomena and their physiological bases.
Prerequisite: PSYC605; or permission of instructor.
Repeatable to: 9 credits if content differs.

PSYC764 Comparative Neuroanatomy (3 Credits)
Demonstrations and lectures on the gross, microscopic and ultrastructural morphology of the central nervous system of vertebrates.
Restriction: Permission of instructor.

PSYC768 Conditioning and Learning (3 Credits)
Alternate years. The literature on the experimental analysis of behavior, with examination of basic experiments and contemporary theories related to them.
Prerequisite: PSYC622.

PSYC778 Seminar in Learning and Memory (3 Credits)
An advanced topical seminar covering the areas of human learning and memory. Acquisition processes, storage and retrieval processes, and attention and information processing.
Prerequisite: PSYC671.
Repeatable to: 6 credits if content differs.

PSYC779 Seminar in Human Performance Theory (3 Credits)
An examination of human-machine interactions with emphasis on theories and research which focus on human performance capabilities and skills. Topics selected from information processing, communications, human computer interaction, decision making, environmental constraints and automation.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.
Formerly: PSYC735.

PSYC788 Special Research Problems (1-4 Credits)
Supervised research on problems selected from the areas of experimental, industrial, social, quantitative, or mental health psychology.

PSYC789 Special Research Problems (1-4 Credits)

PSYC798 Graduate Seminar (1-4 Credits)
Repeatable to: 12 credits if content differs.

PSYC799 Master's Thesis Research (1-6 Credits)

PSYC818 Research Issues in Personality Or Development (3 Credits)
Experimental design and methodology and statistical treatment of data appropriate to personality or developmental research; critical analysis of major current areas of research including methodologies, findings and implications. The course will focus on either personality research or developmental research in a given semester.
Prerequisite: PSYC602 and PSYC601. And PSYC611 or PSYC612; or students who have taken courses with comparable content may contact the department.
Repeatable to: 9 credits.

PSYC819 Seminar in Personality and Development (3 Credits)
An advanced seminar covering specialized topics.
Repeatable to: 9 credits.

PSYC859 Special Topics in Perception (3 Credits)
Intensive study of selected topics in perception.
Prerequisite: PSYC605; or permission of instructor.
Repeatable to: 6 credits.

PSYC878 Current Research in Language and Cognition (3 Credits)
Seminar will cover current research and methodological issues in language and cognition. Specialized topics include: computer models of cognitive behavior; cross-cultural studies in language and thought; mathematical and analytical techniques for assessing structures; and others.
Prerequisite: PSYC671.
Repeatable to: 6 credits.

PSYC888 Research Methods in Psychology (1-3 Credits)

PSYC889 Research Methods in Psychology (1-3 Credits)

PSYC898 Pre-Candidacy Research (1-8 Credits)

PSYC899 Doctoral Dissertation Research (1-8 Credits)

PUAF - Public Policy

RDEV - Real Estate Development

RDEV450 Foundations of Real Estate Finance and Investment (3 Credits)
Real Estate Finance and Investment addresses how real estate value is established, the fundamental foundations of the time value of money, as well as more real estate specific applications of return on investment, net operating income, the components of a real estate sources and uses statement, sources of real estate equity and debt financing, commonly used debt ratios and equity returns in real estate, as well as concepts of sensitivity analysis and exit strategies.
Prerequisite: Must have completed RDEV270 or an approved accounting course with a grade of C- or better; and minimum grade of C- in RDEV350.
Restriction: Must be enrolled in RDEV Minor; and permission of ARCH-School of Architecture, Planning, & Preservation.

RDEV478 Special Topics in Real Property Development (1-3 Credits)
RDEV 478 will address one or more current topics in real property with a focus in one or more of the areas of real estate development from planning and entitlements, to design and construction, to market analysis and valuation, to finance and investment, to operations and property management, or social and economic impacts.
Recommended: RDEV250, RDEV350, and RDEV450.
Restriction: Permission of ARCH-School of Architecture, Planning, & Preservation.
Repeatable to: 6 credits if content differs.

RDEV600 Principles and Practice of Real Property Development (3 Credits)
An introduction to basic principles of real estate development: How real estate and communities get built and how value is created. The emphasis is on entrepreneurship and an experiential learning approach to the entrepreneurial real estate development process, principles, and practice.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688T or RDEV600.
Formerly: RDEV688T.

RDEV603 Introduction to Real Property Finance (3 Credits)
Introduction to Real Property Finance addresses how real estate value is established, the fundamental foundations of the time value of money, as well as more real estate specific applications of return on investment, net operating income, the components of a real estate sources and uses statement, sources of real estate equity and debt financing, commonly used debt ratios and equity returns in real estate, as well as concepts of sensitivity analysis and exit strategies.
Restriction: Permission of the Department.
Credit Only Granted for: RDEV688Z, RDEV689V, or RDEV603.
Formerly: RDEV688Z and RDEV689V.

RDEV605 Tax and Accounting for Real Property Developers (3 Credits)
This course is designed to familiarize students with taxation and accounting as it pertains to real estate development.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688K or RDEV605.
Formerly: RDEV688K.

RDEV610 Real Property Development Law and Ethics (3 Credits)
Presents foundational knowledge about real property, contracts, administrative and constitutional law, and ethical principals and reasoning skills.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688A or RDEV610.
Formerly: RDEV688A.

RDEV615 Principles, Process and Politics of Planning for Real Property Development (3 Credits)
Designed to introduce and familiarize students with planning and zoning and the associated processes and requirements that impact the real property development process and products. It will look at the roles the community and politics play in shaping the built environment and the development process.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688G or RDEV615.
Formerly: RDEV688G.

RDEV620 Market Analysis for Real Property Development (3 Credits)
Designed to introduce and familiarize students with completing market analysis for real property projects. Includes a broad range of land uses including for-rent and for-sale residential, retail, office, and hospitality. Covers all aspects of completing a market analysis from the site visit to recommendations, and all the steps in-between. Examines how various real estate practitioners, such as developers, builders, investors, landowners, and public officials, utilize market studies.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV689M or RDEV620.
Formerly: RDEV689M.

RDEV630 Real Property Finance and Investment (3 Credits)
This course is designed to introduce students who have experience in real estate finance or have taken an introductory course in real estate finance and investment to move to this intermediate course that addresses foundational concepts of commercial real estate finance and the measures used in analyzing and evaluating real estate projects. Quantitative analysis and financial modeling comprise the main focus.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV630, RDEV688B, or URSP664.
Formerly: RDEV688B.

RDEV635 Capital Markets and Real Estate Investments for Developers (3 Credits)
An advanced course in real estate finance focusing on capital markets and complex financing mechanism in the public and private markets for raising capital for development of public, private and public/private projects.
Prerequisite: RDEV630, URSP664, or RDEV688.
Restriction: Must be in Real Estate Development (Master's) program; or permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV635 or RDEV688F.
Formerly: RDEV688F.

RDEV640 Principles of Urban Design for Real Property Developers (3 Credits)
Introduces students to the design issues associated with development of the basic real property asset classes (office, retail, and residential) and the context driven forces that shape these different development types. Also introduces non-design students to the principles of visual literacy and the capacity of different property to support development in the effort to enhance a community.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688J or RDEV640.
Formerly: RDEV688J.

RDEV650 Essentials of Design and Construction Management for Development Professionals (3 Credits)
Essential terminology, process and substantative knowledge needed by development professionals to effectively move a project through the design and construction process; includes environmental and ethical considerations throughout the process.
Restriction: Must be in Real Estate Development (Master's) program; or permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV650 or RDEV688C.
Formerly: RDEV688C.

RDEV660 Commercial Leasing for Real Property Developers (3 Credits)
Provides students with a hands-on look at commercial and real estate leases, lease provisions, and current market activity, a key factor in determining when and whether to proceed with developing a commercial property.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688L or RDEV660.
Formerly: RDEV688L.

RDEV670 Negotiating Agreements & Resolving Conflicts when Developing Real Property (3 Credits)
Designed to develop students' negotiation and leadership skills for managing differences between individuals and groups while in the process of developing and operating real property. Includes a blend of skill-building exercises and theory discussions about the behavior of individuals to understand negotiation dynamics.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688E or RDEV670.
Formerly: RDEV688E.

RDEV688 Selected Topics in Real Estate Development (3 Credits)
Selected topics in real estate development.
Prerequisite: Permission of ARCH-Real Estate Development.
Repeatable to: 8 credits if content differs.

RDEV689 Current Topics in Real Estate Development (1-3 Credits)
Explores a focused aspect in any of the five major phases of real estate development: planning, finance, law, design, construction, or management.

RDEV690 Capstone Project: Real Property Feasibility Study (3 Credits)
The capstone course is designed to provide students with an opportunity to apply acquired classroom knowledge to real world conditions. Each student in the class will work separately to create a development proposal and feasibility study for an assigned property. For students doing a feasibility study of a development the study will address at least market analysis, entitlement process, construction, and financing for the project.
Prerequisite: Completion of at least 7 RDEV courses.
Restriction: Permission of ARCH-Real Estate Development.
Credit Only Granted for: RDEV688I or RDEV690.
Formerly: RDEV688I.

RELS - Religious Studies

RELS400 Methods and Theories in the Study of Religion (3 Credits)
An exploration of scholarly approaches to the study of religion. The modern history of the secular study of religion, social dynamics, textual formations, and ritual practices.Jointly offered with RELS600.
Credit Only Granted for: RELS400, RELS419T,RELS600, or RELS619T.
Formerly: RELS419T.

RELS408 Capstone Seminar for Religions of the Ancient Middle East (3 Credits)
A capstone seminar for majors in Religions of the Ancient Middle East, designed to provide the intellectual framework for a substantial, interdisciplinary research project. Course topics will be thematic and students will be encouraged to explore comparative or interdisciplinary approaches.
Repeatable to: 6 credits if content differs.

RELS419 Advanced Topics in Religious Studies (3 Credits)
The contemporary study of religion in which topics may address specific religious traditions, regional or historical developments, or methodological and theoretical issues.
Recommended: RELS216.
Repeatable to: 9 credits if content differs.

RELS419R Tradition and Change: Jewish Religion in the Modern World (3 Credits)
An exploration of the history of the different modern Jewish religious movements that developed in Europe, starting with messianic movements and ending with Reform and Orthodoxy. Emphasis will be placed on the influence of the academic study of Judaism on the development of modern Jewish religious ideologies and practices.Cross-listed with: HIST429X, RELS347.
Credit Only Granted for: RELS347, JWST347, HIST429X, or RELS419R.
Formerly: RELS419R.

RELS429 Advanced Topics in Religious History (3 Credits)
Advanced study of religious history in a particular setting, with attention to particular themes, texts, events, or communities.
Recommended: RELS216 or RELS289.
Repeatable to: 9 credits if content differs.

RELS430 Dead Sea Scrolls (3 Credits)
A study of the Dead Sea Scrolls in their ancient and modern settings, and in terms of contemporary scholarly interpretations of their meaning. Interpretations of the historical significance of these documents, their connections to ancient Jewish sectarian movements, and their implications for our understanding of Judaism, Christianity, and the history of the Bible.
Prerequisite: Must have completed one JWST course or one RELS course; or permission of ARHU-Meyerhoff Program & Center for Jewish Studies. Cross-listed with JWST430.
Credit Only Granted for: JWST430 or RELS430.

RELS439 Advanced Topics in Religious Thought (3 Credits)
Advanced study of religious thought in a particular setting, with attention to particular themes, texts, events, or communities.
Recommended: RELS216 or RELS289.
Repeatable to: 9 credits if content differs.

RELS488 Honors Thesis Research in Religions of the Ancient Middle East (3 Credits)
Guided research on a thesis under the supervision of a faculty mentor.
Repeatable to: 6 credits if content differs.

RELS499 Independent Study in Religious Studies (1-3 Credits)
An advanced independent research project for qualified students, supervised by a faculty member, on a topic not ordinarily covered in available courses.
Prerequisite: Permission of ARHU-Meyerhoff Program & Center for Jewish Studies.
Repeatable to: 6 credits if content differs.

RELS600 Methods and Theories in the Study of Religion (3 Credits)
An exploration of scholarly approaches to the study of religion. The modern history of the secular study of religion, social dynamics, textual formations, and ritual practices.Jointly offered with RELS400.
Credit Only Granted for: RELS400, RELS419 T, RELS600, or RELS619T.
Formerly: RELS619T.

RELS619 Directed Readings in Religous Studies (3 Credits)
Individual Instruction course.
Repeatable to: 6 credits if content differs.

RUSS - Russian

RUSS401 Advanced Russian Composition (3 Credits)
Approaches to argumentation, organization of information, contextualized grammar, appropriateness of lexical choice, genre, and register.
Prerequisite: RUSS302; or students who have taken courses with comparable content may contact the department.
Restriction: Not open to native speakers of Russian.

RUSS402 Practicum in Written Russian (3 Credits)
Designed to improve comprehension of functional varieties of written Russian and develop ability to present in written form concise syntheses of source texts.
Prerequisite: RUSS401; or students who have taken courses with comparable content may contact the department.

RUSS403 Russian Conversation: Advanced Skills (3 Credits)
Advanced spoken production of high-level, abstract language.
Prerequisite: RUSS303; or students who have taken courses with comparable content may contact the department.

RUSS404 Practicum in Spoken Russian (3 Credits)
To improve comprehension of rapidly spoken Russian of various functional styles and to develop ability to synthesize orally the content of spoken material.
Prerequisite: RUSS403; or students who have taken courses with comparable content may contact the department.

RUSS405 Russian-English Translation I (3 Credits)
Introduction to the principles of translation of a particular genre, and is typically diplomatic, business, or literary.
Prerequisite: Must have completed or be concurrently enrolled in RUSS302.

RUSS406 Russian-English Translation II (3 Credits)
Continuation of RUSS405.
Prerequisite: RUSS405.

RUSS409 Selected Topics in Russian Language Study (3 Credits)
Presentation of a topic in Russian language study.
Restriction: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

RUSS411 Linguistic Analysis of Russian I (3 Credits)
Elucidation of theoretical concepts of modern linguistics through the analysis of problematic concepts in the Russian linguistic system. Phonology and the syntax of the simple sentence.
Prerequisite: Must have completed or be concurrently enrolled in RUSS301.

RUSS412 Linguistic Analysis of Russian II (3 Credits)
Continuation of RUSS411. The syntax of the complete sentence, semantics.
Prerequisite: RUSS411.

RUSS433 Russian Literature of the 20th Century (3 Credits)

RUSS439 Selected Topics in Russian Literature (3 Credits)
Presentation of a topic in Russian literature.
Restriction: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

RUSS499 Independent Study in Russian (1-3 Credits)
Independent study under faculty supervision.
Prerequisite: Permission of instructor.
Repeatable to: 6 credits if content differs.

RUSS618 Special Topics in Linguistic Analysis of Russian (3 Credits)
Aspects of Russian linguistics such as stress, verbal, tense, taste, word order, or problems in lexical semantics.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

RUSS619 Seminar in Linguistic Analysis of Russian (3 Credits)
Current research in Russian linguistic analysis.
Prerequisite: RUSS610; and (RUSS612, RUSS611, or RUSS613).
Repeatable to: 6 credits if content differs.

RUSS673 History of the Russian Language (3 Credits)
Introduction to historical Russian grammar and phonological developments in Russian.
Prerequisite: SLAV475.

RUSS679 Special Topics in Slavic Linguistics (3 Credits)
Topics concerning contrastive, historical, and dialectical Slavic linguistics, in relation to our understanding of grammatical theory.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

RUSS798 Independent Study (1-3 Credits)
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

RUSS799 Thesis Research (1-6 Credits)
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 6 credits if content differs.

SLAA - Second Language Acquisition and Application

SLAA410 Second Language Acquisition: Theory, Research, and Practice (3 Credits)
Introduces vibrant and expanding branch of language science and cognitive science: theory, research and practice in SLA. Students apply what they learn to practical issues ranging from learning languages as an adult to societal problems involving second languages and dialects.
Prerequisite: LING200, LING240, PSYC200, PSYC221, or PSYC354.

SLAA498 Second Language Research and Practicum (1-3 Credits)
Individualized research and practicum for undergraduate students to work as Undergraduate Research Assistants (UGRA) on existing projects under the supervision of a PhD Graduate Supervisor (GS) in the area of second language acquisition to learn/experience how second language as well as psycholinguistic research is conducted.
Restriction: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 9 credits if content differs.
Additional Information: UGRAs register for 1-3 credits. A specific weekly schedule will be determined at the beginning of the semester. Throughout the semester, students will meet with the Graduate Supervisor (GS) once per week to discuss the theoretical and methodological background of the project as well as the broader area behind the research. In addition to the training in theoretical background, the first several weeks of the semester will be devoted to hands-on details of running subjects using a particular method and analyzing data. When this training is complete, UGRAs will work more independently to schedule and run research projects and process the data.

SLAA610 Research and Theories in Second Language Acquisition (3 Credits)
Introduction to current theories and research findings Second Language Acquisition (SLA).

SLAA611 Fundamentals of Foreign Language Acquisition and Instruction (3 Credits)
Introduction to theoretical and practical issues relevant to foreign language learning, language acquisition, and curriculum construction.

SLAA620 Second Language Research Methodologies (3 Credits)
An exploration of research methodology in second language acquisition (SLA), with a focus on developing practical skills in data analysis and interpretation. Preparation in both critical evaluation of existing research and design of new research models.
Prerequisite: SLAA610; and must have completed or be concurrently enrolled in SLAA611.

SLAA629 Special Topics in Sociolinguistics (3 Credits)
Current topics in research in sociolinguistics.
Repeatable to: 9 credits if content differs.

SLAA630 Second Language Testing (3 Credits)
An introduction to basic concepts in the assessment of second language knowledge. Issues of reliability, dependability, construct validity, utility, and washback on instruction are examined.
Prerequisite: SLAA610; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SLAA639 Special Topics in Applied Linguistics (3 Credits)
Current topics in research in applied linguistics.
Repeatable to: 9 credits if content differs.

SLAA640 Psycholinguistics (3 Credits)
An introduction to the field of psycholinguistics that covers speech perception, word recognition, sentence and discourse processing, speech production, and language acquisition. Basic concepts, research methods, major research topics, leading theories and related research findings, with implications of psycholinguistic theories and findings for second language studies.
Prerequisite: SLAA610; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SLAA649 Special Topics in Second Language Acquisition (3 Credits)
Current topics in research in second language acquisition.
Repeatable to: 9 credits if content differs.

SLAA650 Second Language Analysis (3 Credits)
An overview of the field of linguistics with a particular attention to its application in SLA studies, introduces students to the basic concepts and skills related to the scientific study of language, and provides them with opportunities to apply these concepts and skills in the analysis of language. It covers topics such as phonetics, phonology, morphology, syntax, semantics, language acquisition, and language use.
Prerequisite: SLAA610; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SLAA719 Second Language Acquisition and Application Internship (3 Credits)
Internship at a site to be determined. Topics may include heritage language learning, immersion education, testing and assessment, translation and interpretation, and national language planning and policy.
Repeatable to: 6 credits if content differs.

SLAA741 Cognitive Processes in Second Language Learning (3 Credits)
Examines the roles played by varied types of learning processes and memory, general processing issues, and the cognitive bases of individual differences in learning and processing a second language.
Prerequisite: SLAA610; or students who have taken courses with comparable content may contact the department.

SLAA742 Second Language Processing (3 Credits)
Covers leading theoretical approaches and experimental methods in second language processing. Draws on research and theories in Second Language Acquisition (SLA), formal linguistics, cognitive grammar, psycholinguistics, and neurolinguistics.
Restriction: Permission of instructor required for MA students.

SLAA744 Age Effects in Second Language Learning (3 Credits)
Consideration of the empirical evidence for age effects in second language learning and its potential confounds. Critical evaluation of the differing interpretations of these effects and their implications for educational practice, SLA theory, development psychology, and research methodology.
Prerequisite: SLAA610.
Restriction: Permission of instructor.

SLAA749 Special Topics in Second Language Learning (3 Credits)
Current topics in research on Second Language Learning.
Prerequisite: SLAA610; or permission of instructor.

SLAA750 Instructed Second Language Acquisition (3 Credits)
Survey of studies on effectiveness of SLA instruction within various domains of language, with focus on research design.
Prerequisite: SLAA610.

SLAA754 Task-Based Language Teaching (3 Credits)
Overview of Task-Based Language Teaching (TBLT) including needs and means analysis, syllabus design, materials writing, methodology and pedagogy, testing, and evaluation. Theoretical issues addressed include relationship of TBLT to research findings on the psychology of learning and SLA and libertarian approaches to education.

SLAA759 Special Topics in Second Language Instruction (3 Credits)
Topics in the theory and practice of second language instruction.
Repeatable to: 12 credits.

SLAA760 Fundamentals of Second Language Assessment (3 Credits)
An overview of current assessment models in foreign and second language learning.
Prerequisite: SLAA610.

SLAA772 Bilingualism and Multilingualism (3 Credits)
Critical exploration of concepts in bilingualism and multilingualism with emphasis on the social environments of second language acquisition, through the lens of cognitive and social frameworks. Implications of bilingualism for memory, affect, language processing and code-switching/mixing, as well as the social implications of knowing and using more than one language.
Prerequisite: SLAA610; or permission of instructor.

SLAA773 The Heritage Language Speaker (3 Credits)
Critical exploration of the theoretical issues and existing experimental research on heritage language learning and use as well as consideration of classroom and curricular implications of heritage language learning.
Restriction: Permission of instructor required for Master students.

SLAA779 Directed Research in Second Language Acquisition and Application (1-3 Credits)
Directed independent research in Second Language Acquisition or Application. In this capstone project, students engage in independent research under faculty direction.
Repeatable to: 3 credits if content differs.

SLAA798 Master's Independent Study (1-3 Credits)
Repeatable to: 6 credits if content differs.

SLAA799 Master's Thesis Research (1-6 Credits)

SLAA888 Doctoral Independent Study (1-3 Credits)
Individual instruction course.
Prerequisite: Permission of ARHU-College of Arts & Humanities.
Repeatable to: 9 credits if content differs.

SLAA898 Pre-Candidacy Research (1-8 Credits)

SLAA899 Doctoral Dissertation Research (1-8 Credits)

SLLC - School of Languages, Literatures and Cultures

SLLC400 Articulatory Phonetics for Second Language Acquisition and Application (3 Credits)
The mechanical capabilities of the human vocal apparatus for producing speech sounds, and their terminology and transcription in the International Phonetic Alphabet. Emphasis is on the practical needs of the teacher and student of foreign language, rather than the theoretical linguist or the hearing-and-speech pathologist. The phonetics of major languages are also introduced, with attention to the pedagogy of their phonetics.
Restriction: Junior standing or higher.
Credit Only Granted for: SLLC400.

SLLC410 Documentary and Narrative (3 Credits)
An examination of the relationship between film and reality, focusing on documentary film.
Prerequisite: ENGL245, FILM245, or CINE245; or permission of ARHU-School of Languages, Literatures, and Cultures department. Cross-listed with: CINE410.
Credit Only Granted for: SLLC410, CINE410 or FILM410.
Formerly: FILM410.

SLLC411 Experimental Film (3 Credits)
Introductory survey of European and U.S. American experimental cinema.Cross-listed with: CINE411.
Credit Only Granted for: SLLC411, CINE411 or FILM411.
Formerly: FILM411.

SLLC461 Political Cinema (3 Credits)
Histories of cinema and politics in the 20th century.
Prerequisite: ENGL245, FILM245, or CINE245; or permission of ARHU-School of Languages, Literatures, and Cultures department. Cross-listed with: CINE461.
Credit Only Granted for: CINE461, FILM461 or SLLC461.
Formerly: FILM461.

SLLC463 Screening Time: History and Memory in Cinema (3 Credits)
An examination of the ways and techniques with which cinema produces a sense of time in the viewer.
Prerequisite: ENGL245, FILM245, or CINE245; or permission of ARHU-College of Arts & Humanities. Cross-listed with: CINE463.
Credit Only Granted for: SLLC463, CINE463 or FILM463.
Formerly: FILM463.

SLLC468 Special Topics in Film Studies II (3 Credits)
Exploration of topics in film studies beyond national traditions, for example through the lens of theory, genre, auteurship, aesthetic movements in cinema, and/or comparative perspectives. Courses at the 400-level have higher expectations of independent work, including reading and written assignments.
Repeatable to: 12 credits if content differs.

SLLC471 The Cultural Environment of Global Business (3 Credits)
The goal of this course is to provide students with an understanding of cultural aspects pertaining to global business, and thereby increasing their awareness of the cultural factors that motivate decisions and behavior in the business world. Students will gain an understanding of how the business cultures in the rest of the world diverge from the American, and develop the cultural understanding, attitudes, and communication skills needed to function appropriately within an increasingly global and multicultural working environment.
Restriction: Sophomore standing or higher.
Credit Only Granted for: ARHU439B, ARHU439E, ARHU439T, ENES472, SLLC471, SLLC472, or SLLC473.
Formerly: ARHU439B.

SLLC473 European Business Cultures (3 Credits)
The goal of this course is to provide students with an understanding of cultural aspects pertaining to European business, and thereby increasing their awareness of the cultural factors that motivate decisions and behavior in the European business world. Students will gain an understanding of how the European business cultures diverge from the American, and develop the cultural understanding, attitudes, and communication skills needed to function appropriately within an increasingly global and multicultural working environment.
Restriction: Sophomore standing or higher.
Credit Only Granted for: ARHU439B, ARHU439E, ARHU439T, ENES472, SLLC471, SLLC472, or SLLC473.
Formerly: ARHU439E.

SLLC499 Special Topics in World Cultures (3 Credits)
Interdisciplinary, transnational or cross-language course; specific topic to be announced.
Repeatable to: 12 credits if content differs.

SLLC601 Teaching Foreign Languages in Higher Education (1 Credit)
Methods and materials for teaching foreign languages in higher education.
Restriction: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Credit Only Granted for: SLLC601 or SPAN605.
Formerly: SPAN605.

SLLC698 Special Topics in Interdisciplinary Studies (1-3 Credits)
Cross-departmental or cross-programmatic study within the School of Languages, Literatures, and Cultures. Topic to be announced when course is offered.

SLLC789 Master's Independent Study (1-3 Credits)
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

SLLC878 Pedagogical Mentoring for Doctoral Students (1 Credit)
Pedagogical mentoring by faculty members for doctoral students who have completed their first semester of TA training.
Prerequisite: SLLC601; and permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 8 credits if content differs.

SLLC889 Doctoral Independent Study (1-3 Credits)
Repeatable to: 6 credits if content differs.

SOCY - Sociology

SOCY401 Intermediate Statistics for Sociologists (3 Credits)
This is a course about multiple regression for undergraduate students and presumes that students taking this course will be both producers and consumers of multiple regression results. Students will work with the instructor to produce a research poster presentation based on secondary social science data. In addition to multivariable statistics, students will learn some statistical programming as well as how to organize a research presentation.
Prerequisite: SOCY201 and SOCY202; or permission of the Sociology department.
Restriction: Must not have completed STAT400, BMGT231, or ENEE324.

SOCY405 Scarcity and Modern Society (3 Credits)
Resource depletion and the deterioration of the environment. Relationship to lifestyles, individual consumer choices, cultural values, and institutional failures. Projection of the future course of American society on the basis of the analysis of scarcity, theories of social change, current trends, social movements, government actions, and the futurist literature.
Prerequisite: 6 credits in SOCY courses.
Credit Only Granted for: SOCY305 or SOCY405.
Formerly: SOCY305.

SOCY407 Explaining Social Change: Historical and Comparative Methods (3 Credits)
Examines social change from the perspective of comparative and historical sociology to get at the question, 'where are we now?' Students develop a critical appreciation of how scholars construct persuasive explanations for large-scale change focusing on four central questions: the origins of markets and industrial capitalism; the emergence of democracy as opposed to dictatorship; the causes and consequences of social revolution; and the logic of armed conflict. Explanations offered for the changes in question as well as the methods employed are explored. Counterfactual hypotheticals for each central question--that is, what might have been, rather than what historically emerged--are considered.
Prerequisite: 6 credits in SOCY courses.
Credit Only Granted for: SOCY407 or SOCY498Y.
Formerly: SOCY498Y.

SOCY410 Social Demography (3 Credits)
Types of demographic analysis; demographic data; population characteristics; migration; mortality; fertility; population theories; world population growth; population policy.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY411 Demographic Techniques (3 Credits)
Basic techniques for analyzing population structure and demographic processes, including fertility, mortality and migration.
Prerequisite: (SOCY201; or students who have taken courses with comparable content may contact the department); and SOCY410. Or permission of BSOS-Sociology department.

SOCY412 Family Demography (3 Credits)
Family and population dynamics. Fertility issues, such as teenage pregnancy, the timing of parenthood, and family size, as they relate to family behavior, such as marital patterns, child care use, and work and the family. Policy issues that relate to demographic changes in the family.
Prerequisite: SOCY201 and SOCY202; or permission of the Sociology department.

SOCY413 Sociology of Aging (3 Credits)
The aging of the population is one of the major demographic changes affecting social institutions during the next century. Research demography, sociology, economics, epidemiology, psychology and public health are integrated to develop a broader understanding of the causes and consequences of population aging. A central focus is the diversity of experiences by age, gender, socioeconomic status and health.
Prerequisite: SOCY201 and SOCY202; or permission of the Sociology department.

SOCY415 Environmental Sociology (3 Credits)
Overview of the field and theoretical themes within the area of environmental sociology and technology. Current issues are explored including: environmental attitudes; environmental movements; environmental justice; globalization; global climate change; and garbage and food.
Prerequisite: 6 credits in SOCY courses.

SOCY418 Research in Family & Demography (3 Credits)
This is a special topics research course for Family and Demography.
Prerequisite: SOCY201 and SOCY202; or permission of the Sociology department.
Repeatable to: 6 credits if content differs.

SOCY420 Qualitative Research Methods in Sociology (3 Credits)
Using the sociological imagination to independently explore research questions as designed by students. Readings will explore dilemmas qualitative researchers confront such as, how to conduct research ethically and how their background influences their findings and analysis. Students will learn how to collect data, analyze it, and present it to others.
Prerequisite: SOCY201 and SOCY202.

SOCY424 Sociology of Race Relations (3 Credits)
Analysis of race-related issues, with a primary focus on American society. The historical emergence, development, and institutionalization of racism; the impact of racism on its victims; and racially based conflict.
Prerequisite: 6 credits in SOCY courses; or permission of UGST-Undergraduate Studies. Cross-listed with: AAST424.
Credit Only Granted for: AAST424 or SOCY424.

SOCY428 Research in Inequality (3 Credits)
This is the special topics research course for Stratification and Inequality.
Prerequisite: SOCY201 and SOCY202; or permission of the Sociology department.
Repeatable to: 6 credits if content differs.

SOCY431 Principles of Organizations (3 Credits)
Structural and processual characteristics of organizations that make them effective for different purposes and in different environments. Effects of different institutional environments, small group processes, organizational networks, and leadership. Types of organizations studied include formal bureaucracies, professional organizations, and voluntary associations.
Prerequisite: SOCY201 and SOCY202; or permission of BSOS-Sociology department.

SOCY432 Social Movements (3 Credits)
Movements that seek change in the social and political structure of society. Origins, tactics, organization, recruitment, and success. Case studies come from such movements as labor, civil rights, student, feminist, environmental, neighborhood, and gay rights.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY435 Society, Biology, and Health (3 Credits)
It is not too far-fetched to speak of the pancreas under capitalism or the proletarian lung. Humans are social beings in physical bodies. In this course, we draw on research studies, podcasts, news articles, and best-selling non-fiction to inform conversation and writing on how various dimensions of human biology influence, and are influenced by, our social and cultural environment. We focus on conceptualizing human behavior as an interplay between both nature and nurture, and consider how this approach changes our understanding of modern social problems. This course is appropriate for students with a range of backgrounds in the social and natural sciences; introductory-level supplemental readings on all necessary biological concepts will be provided.
Prerequisite: Must have completed 6 credits in SOCY courses or permission of BSOS Sociology Department.

SOCY441 Social Stratification and Inequality (3 Credits)
The sociological study of social class, status, and power. Topics include theories of stratification, correlates of social position, functions and dysfunctions of social inequality, status inconsistency, and social mobility.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.
Restriction: Junior standing or higher.

SOCY442 The Black Middle Class (3 Credits)
Students will learn about the Black Middle Class. They will examine and explore the historical context that led to the rise of a Black Middle Class. Innovative avenues into the Black Middle Class will also be examined, including various household and family formations. Finally, the course will cover the consequences of being in the The Black Middle Class, with an emphasis on residential segregation and racial identity.
Prerequisite: 6 credits in SOCY courses.
Credit Only Granted for: SOCY498T or SOCY442.
Formerly: SOCY498T.

SOCY445 Sex and Love in Modern Society (3 Credits)
Sociological theories of sex and gender are used to explore empirical research on women's and men's sexual behavior and attitudes; variation in gendered sexuality by key social characteristics and how gendered sexuality is constructed and controlled; changes in sexuality over time and across relationship types, focusing on changes in sexual desire and behaviors and on the changing meaning of sex and marriage in U.S. society and other countries. Contemporary debates about sexuality will also be examined.
Prerequisite: SOCY201, SOCY202, SOCY203, and SOCY230.
Restriction: Must be in Sociology program; or permission of BSOS-Sociology department.
Credit Only Granted for: SOCY498X or SOCY445.
Formerly: SOCY498X.

SOCY457 Sociology of Law (3 Credits)
Social, political, and cultural sources of legal norms and concepts; and how the law shapes society and society shapes the law using sociological theoretical frameworks. The role of social change, social reproduction and inequality (including race, class, gender, and sexuality) to achieve certain objectives such as compliance, deterrence and social control.

SOCY458 Special Topics in Study Abroad IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

SOCY464 Military Sociology (3 Credits)
Social change and the growth of military institutions. Complex formal military organizations. Military service as an occupation or profession. The sociology of military life. Relations between military institutions, civilian communities and society.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY465 The Sociology of War (3 Credits)
The origin and development of armed forces as institutions, the social causes, operations and results of war as social conflict; the relations of peace and war and revolution in contemporary civilizations.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY467 Sociology of Education (3 Credits)
Sociological analysis of educational institutions and their relation to society: goals and functions, the mechanisms of social control, and the impacts of stratification and social change. Study of the school as a formal organization, and the roles and subcultures of teachers and students.
Prerequisite: 6 credits in SOCY courses; or permission of BSOS-Sociology department.

SOCY480 Researching the Middle East (3 Credits)
Introduces religion, gender, and politics in the Middle East and North Africa. After an overview of the political and social history the focus will be on methods for carrying out research on fundamental issues facing Middle Eastern societies, including national identity, religion, gender relations and the status of women in the family, politics, education, and labor market.
Prerequisite: SOCY201 and SOCY202; or permission of the Sociology department.
Credit Only Granted for: SOCY498E or SOCY480.
Formerly: SOCY498E.

SOCY481 Ideology and Social Conditions in the Making of Terrorism in the Middle East and North Africa (3 Credits)
The sociology of terrorism and political violence in the Middle East and North African will be explored in this course.
Prerequisite: Must have completed 6 credits in SOCY courses or permission of the Sociology department.
Restriction: Sophomore standing or higher.

SOCY490 Experimental Research Practicum (3 Credits)
Hands-on experience in designing, conducting, and analyzing experimental research. Introduces students to causal inference in social scientific research, focusing on experimental designs. Students will get hands-on research experience running experimental studies in the group processes lab. Students will also work with the professor and graduate students in the department to develop a research idea that can be executed in the spring semester.
Prerequisite: SOCY201 and SOCY202; or permission of the Sociology department.
Additional Information: This is the first course in the experimental research practicum 2-course sequence.

SOCY491 Experimental Research Design (3 Credits)
Students will finalize the design of their studies from the fall semester and carry out the research in this course. Introduces students to analyzing experimental data and presenting results from these data. Students will continue to get hands-on research experience running experimental studies in the group processes lab and working with the professor and graduate students in the department to further develop their projects.
Prerequisite: SOCY201, SOCY202 and SOCY490; or permission of BSOS-Sociology department.
Additional Information: This is the second course in the experimental research practicum 2-course sequence.

SOCY498 Selected Topics in Sociology (1-3 Credits)
Topics of special interest to advanced undergraduates in sociology. Such courses will be offered in response to student request and faculty interest.
Prerequisite: SOCY201 and SOCY202; or permission of BSOS-Sociology department.
Repeatable to: 6 credits.

SOCY601 Statistics For Sociological Research I (3 Credits)
Introductory statistical concepts are covered including descriptive statistics, probability, sampling distributions, expected values, hypothesis testing, tests of significance, measures of association, and if time permits, introduction to regression analysis. Statistical programming software may be used.
Prerequisite: SOCY201; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.
Credit Only Granted for: SOCY601 and SURV601.

SOCY602 Statistics For Sociological Research II (3 Credits)
This course introduces regression analysis using matrix algebra. Topics include bivariate regression, multivariate regression, tests of significance, regression diagnostics, indicator variables, interaction terms, extra sum of squares, and the general linear model. Other topics may be addressed such as logistic regression and path analysis. Statistical programming software may be used.
Prerequisite: SOCY601; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.
Credit Only Granted for: SOCY602 or SURV602.

SOCY609 Practicum in Social Research (3 Credits)
The conduct of research in collection and analysis of social science data under the guidance of experienced investigators. Emphasis on a particular research area of procedure, e.g. secondary analysis of survey data; experimental design; evaluation of research; data collection techniques.
Restriction: Permission of instructor.

SOCY610 Logic of Social Inquiry (3 Credits)
An introductory course on the fundamental issues that arise in the design, execution, analysis, and writing stages of the research process. The course is designed to help first-year graduate students begin their transition from a consumer to a producer of social research.
Restriction: Restricted to Sociology graduate students.
Credit Only Granted for: SOCY699D or SOCY610.
Formerly: SOCY699D.

SOCY611 Introduction to Demographic Methods (3 Credits)
Survey of standard demographic methods for the description and analysis of population size, structure and composition, including techniques for the analysis of fertility, mortality and migration.

SOCY612 Families and Modern Social Theory (3 Credits)
Designed to build knowledge about theories of modernity, with emphasis on modern families. Thus, it combines some core theories of modernity (Giddens, Bourdieu, Foucault), with key theoretical debates about families and intimate relationships (economics and economic sociology, gender, race, class), and social change (development and new family forms).
Credit Only Granted for: SOCY699F or SOCY612.
Formerly: SOCY699F.

SOCY613 Social Movement Theory (3 Credits)
The objective of this course is to introduce students to the field of social movements, with an emphasis on understanding theoretical tools within the field. To accomplish this, students will review theories on social movements including Karl Marx, breakdown approaches, resource mobilization and political process theory, dramaturgy, and new social movement theory. Students will also devote considerable attention to core concepts in the field, including social networks, political opportunity structure, repression, framing, collective identity, and movement outcomes.
Credit Only Granted for: SOCY699R or SOCY613.
Formerly: SOCY699R.

SOCY616 Sociology Pro-Seminar (1 Credit)
The proseminar is the guide to Sociology as a profession, and how sociology is practiced here at the University of Maryland. The goal of the course is to help students gain insider knowledge about how to develop sociological knowledge and capabilities, and what it means to practice sociology as a graduate student and beyond. The course will discuss both practical aspects of professional life in general and specific topics of interest.
Restriction: Must be in Sociology (Doctoral) program.
Credit Only Granted for: SOCCY699P or SOCY616.
Formerly: SOCY699P.

SOCY618 Computer Methods for Sociologists (3 Credits)
Designed to present the potential of the computer as a tool in sociological research. Projects involving programming and running of data manipulation techniques, statistical techniques, and simple simulations.
Prerequisite: SOCY401; or students who have taken courses with comparable content may contact the department. And must have elementary knowledge of a programming language; or CMSC120; or students who have taken courses with comparable content may contact the department.
Restriction: Permission of instructor.

SOCY620 Development of European and American Sociological Theory (3 Credits)
Review of the history of sociological thought with major attention to the key figures (from Marx to C. Wright Mills).
Prerequisite: SOCY203 or SOCY403; or students who have taken courses with comparable content may contact the department; or permission of instructor.

SOCY621 Contemporary Sociological Theory (3 Credits)
Review of sociological theory since approximately 1970, with emphasis given to schools of thought (from symbolic interaction to post-modernism) and priciple participants in them (from Goffman to Baudrilliard).
Prerequisite: SOCY620, SOCY203, or SOCY403; or permission of instructor.

SOCY622 The Sociology of Knowledge (3 Credits)
Analysis of the relation of types of knowledge to social structure. Role of social class and social organization in the development of science, political ideology, belief systems and social values. Social roles associated with production of knowledge.

SOCY623 Families and Modern Social Theory (3 Credits)
Modern families will be explored by combining core theories of modernity with key theoretical debates about families and intimate relationships (economics and economic sociology, gender, race), and social change (development and new family forms).
Restriction: Must be in one of the following programs (Sociology (Doctoral); Sociology (Master's)) ; or permission of instructor.

SOCY625 Activism and Global Movements (3 Credits)
An introduction to the research on activism, focusing particularly on the global and transnational aspects of activism and social movements. The course begins with an overview of the theoretical literature on activism and social movements. Then, we will focus on case studies of particular movements that have a global component and have been the focus of recent sociological inquiry: the globalization movement, Arab Spring, and the climate/climate justice movement.
Restriction: Must be enrolled in a Sociology (SOCY) graduate program; or permission of instructor.

SOCY626 Demography of Aging (3 Credits)
Examines the demographic foundations of population aging, focusing on macro and historical patterns as well as on trends in mortality health and disability. Also examines the relationship between aging and social institutions such as the family, the economy and public policy.

SOCY627 Migration (3 Credits)
Examines theories of immigration and immigrant adaptation, empirical patterns of migration and immigration, the economic and social effects of immigration, as well as immigration policy issues.

SOCY630 Population and Society (3 Credits)
Selected problems in the field of population; quantitative and qualitative aspects; American and world problems.

SOCY633 Qualitative Research Methods II, Field Research (3 Credits)
As the second course in the qualitative methods sequence, students are expected to have a general knowledge of qualitative methods. Students should have already learned how to collect and analyze qualitative data using interview and ethnographic methods. Student will spend this semester collecting and analyzing qualitative data and must begin the course with a formulated research question, a plan for data collection and sampling. Each student will spend the first two weeks preparing a proposal for submission the the University of Maryland's Institutional Review Board to gain Human Subjects approval to collect data. Then, students will spend a month collecting data, a month analyzing data using QSR NVivo, which will be taught as part of the coursework, and writing up the findings. The end product of the course will be an empirical paper based on the data collected and analyzed throughout the semester.
Prerequisite: SOCY632; or students who have taken courses with comparable content may contact the department.

SOCY634 Attitudes and Public Opinion (3 Credits)
Processes involved in the formation of attitudes; effects of communication; measurement techniques.

SOCY635 Social Aspects of Fertility (3 Credits)
Demographic and socioeconomic aspects of fertility behavior; causes and consequences of fertilty decline; relationship between women's status and fertility; determinants of adolescent and nonmarital fertility; differential fertility by race/ethnicity and migration status.
Restriction: Permission of instructor.

SOCY637 Demography Of The Labor Force (3 Credits)
Demographic trends as related to the composition of the U.S. labor force and trends in income; employment status of immigrants, women, and minorities; relationship between skills and jobs; types of data available for study of the labor force.
Restriction: Permission of instructor.

SOCY641 Leadership in Diverse Organizations (3 Credits)
Provides students with a practical understanding of leadership and a framework for understanding three key conditions from which effective leadership emerges: timing, organizational characteristics, and individual characteristics. We will consider different dimensions and/or styles of leadership, as well as the methods effective leaders use to build solidarity within groups and organizations.
Restriction: Must be in one of the following programs: Criminology and Criminal Justice (Master's); Criminology and Criminal Justice (Doctoral); Sociology (Master's); Sociology (Doctoral); or permission from either the Sociology Department or Criminology & Criminal Justice Department.

SOCY642 The Sociology of Mental Health (3 Credits)
Social factors that influence mental health. Group dynamics of mental health preservation.

SOCY643 Power and Status in Organizations (3 Credits)
Organizations affect virtually every aspect of modern social life. The impact and reach of public safety organizations--those special entities purportedly designed to maintain order and safety--are particularly influential. Although sociologists, psychologists, economists, and management scholars all examine the workings of status and power within organizations, our perspective will be primarily sociological as we explore how power and status operate within the context of organizations.
Restriction: Must be in one of the following programs: Criminology and Criminal Justice (Master's); Criminology and Criminal Justice (Doctoral); Sociology (Master's); Sociology (Doctoral); or permission from BSOS-Sociology department.

SOCY644 Gender, Work, and Family (3 Credits)
The interrelationships among gender, work, and family in contemporary societies. Major research issues addressed from an interdisciplinary and comparative (international) perspective.

SOCY645 Sociology of the Self Concept (3 Credits)
Theory and empirical research dealing with the social determination and social consequences of the self-concept. Sociological, psychological, and psychoanalytic approaches to the self.

SOCY646 Public Image Management and Policy Solutions (3 Credits)
Explores how to mitigate and solve image management problems that arise in organizations. Students will learn how to evaluate their organization, make recommendations for future development, and implement the practical aspects of the solution. Problems arise daily in organizations. Leaders need effective strategies to mitigate and solve these problems. While some problems are structural, daily problems often focus on social interactions among people. The course will focus on evaluating the source of problems, enhancing cultural competency among employees, restructuring and rebranding the organization, managing public image, and forming and implementing innovative policy solutions for long-term goals.
Restriction: Must be in one of the following programs: Master of Professional Studies in Public Safety Leadership and Administration (MPLA); Criminology and Criminal Justice (Master's); Criminology and Criminal Justice (Doctoral); Sociology (Master's); Sociology (Doctoral); or permission from either the Sociology Department or Criminology & Criminal Justice Department.

SOCY653 Family Demography (3 Credits)
Demograpic perspective on family and household relationships; relationships among economic institutions, family structure, and the content of family life; research from contemporary U.S., historical and cross-cultural sources.
Restriction: Permission of instructor.

SOCY657 Constitutional Law and Public Safety (3 Credits)
Introduces students to the constitutional issues inherent in the practice of policing. Particular emphasis is placed on issues pertaining to the 4th, 5th, and 6th Amendments.
Restriction: Must be in one of the following programs: Master of Professional Studies in Public Safety Leadership and Administration (MPLA); Criminology and Criminal Justice (Master's); Criminology and Criminal Justice (Doctoral); Sociology (Master's); Sociology (Doctoral); or permission from BSOS-Criminology & Criminal Justice department.

SOCY660 Theories of Social Psychology (3 Credits)
An introduction to some of the theories in social psychology that are particularly useful to sociologists. Topics to be covered include theories of cognitive consistency, social exchange, symbolic interaction, role theory, group processes, and collective behavior.
Prerequisite: Must have completed an undergraduate training in sociological research methods, statistics, and theory; or students who have taken courses with comparable content may contact the department.

SOCY661 Social Stratification (3 Credits)
Major theoretical and research problems in the sociology of social stratification. The characteristics, correlates, and consequences of class and status stratification; the distribution of power; the relationship of social stratification to ideology and the institutional orders of society.
Restriction: Permission of instructor.

SOCY664 Armed Forces and Society (3 Credits)
Analysis of the relationship between military organization and modern industrial society. Growth and decline of the mass army, the transition from conscription to all-volunteer forces, the social legitimacy of military organization, the military as a form of industrial organization, and problems of civil-military relations in the modern world.

SOCY671 Sociology of Development (3 Credits)
Third World development at institutional, organizational, and community levels; factors contributing to success, effectiveness and sustainability of development and to problems and hindrances.
Restriction: Permission of instructor.

SOCY673 Sociology of Gender (3 Credits)
This graduate seminar is an introduction to the broad field of sociology of gender. The focus of the seminar is, first, to examine gender as a multilevel system of social practices that construct and reinforce the gender binary, which functions as a master binary that creates "women" and "men" as two different and unequal categories through processes that instill and reinforce gendered identities, interactions, and institutions. In the course, students will examine how gender intersects with other domains of inequality, particularly sexuality, race-ethnicity, social class, and nationality.

SOCY675 Sociology of Emotions (3 Credits)
Reviews the sociological literature on emotion. We will cover wide-ranging topics including the social causes of emotions, social norms about emotions, disparities in emotional experiences, and the ways in which emotions can maintain and reshape society.

SOCY699 Special Social Problems (1-16 Credits)

SOCY701 Issues in the Integration of Theory and Method (3 Credits)
The course is intended solely for advanced doctoral sociology students. The main objective of the course is to develop a dissertation proposal. Consequently, this course may only be taken during or after the semester in which the student completes the specialty (comprehensive) exams.
Prerequisite: Must have attained advanced status in the sociology Ph.D. program; or permission of instructor.
Credit Only Granted for: SOCY699Y or SOCY701.
Formerly: SOCY699Y.

SOCY709 Advanced Special Topics in Data Analysis (3 Credits)
An intensive examination of an area of interest in data analysis, including such topics as log linear analysis; discriminant function analysis; canonical correlation; factor analysis; analysis of qualitative data; content analysis; mathematical models.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY719 Advanced Special Topics in Social Psychology (3 Credits)
An intensive review of an area of current interest in the field, including such topics as social influence; interpersonal attraction; equity theory; the dramaturgical perspective; stress and coping; interpersonal conflict; the social psychology of large organizations.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY728 Advanced Special Topics in Meta-theory (3 Credits)
An intensive examination of an area of interest in sociological theory, including such topics as paradigm conflicts; philosophy of social science; value issues in sociological theory; formal theory.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY729 Advanced Special Topics in Substantive Theory (3 Credits)
An intensive examination of an area of interest in theory or a school of sociological theory, including such topics as ethnomethodology; structuralism; Marxism and critical theory; historical study of a major sociological theorist such as Marx, Weber, or Durkheim.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY739 Advanced Special Topics in Organizations and Occupations (3 Credits)
An intensive review of an area of current interest in the field, including such topics as managing organizational data sets; problems of industrial democracy; quality of work life; innovation and productivity.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY749 Advanced Special Topics in Demography (3 Credits)
An intensive review of an area of current interest in the field, including such topics as population policy; social and demographic issues in aging; migration; family demography.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY758 Advanced Special Topics in Sex Roles (3 Credits)
An intensive review of an area of current interest in the field, including such topics as labor force participation; comparative studies; sex roles and aging; gender socialization.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY759 Advanced Special Topics in Sociology of the Family (3 Credits)
An intensive review of an area of current interest in the field, such as alternative family life styles, cross-cultural and comparative family studies; victimization (sexual and physical abuse).
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY769 Advanced Special Topics in Military Sociology (3 Credits)
An intensive review of an area of current interest in the field, including such topics as women in the military; conscription and national service; organizational change in the military; comparative studies of the military.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY789 Advanced Special Topics in Social Stratification (3 Credits)
An intensive examination of an area of interest in the field, including such topics as macrostratification; measurement of prestige; institutional variation in status attainment.
Restriction: Permission of instructor.

SOCY799 Master's Thesis Research (1-6 Credits)

SOCY819 Research Seminar in Social Psychology (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in social psychology.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY829 Research Seminar in Sociological Theory (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in sociological theory.
Restriction: Permission of instructor.
Additional Information: May be repeated for credit with permission of instructor.

SOCY839 Research Seminar in Organizations and Occupations (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in organizations or occupations.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY849 Research Seminar in Demography (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in demography.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY858 Research Seminar in Gender, Work and Family (1 Credit)
An advanced research seminar for students preparing to do research or take the specialty examination in Gender, Work and Family.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY859 Research Seminar in Sociology of the Family (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in sociology of the family.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY869 Research Seminar in Military Sociology (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in military sociology.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY889 Research Seminar in Social Stratification (1 Credit)
An advanced research seminar for students preparing to do research or take comprehensive examinations in stratification.
Restriction: Permission of instructor.
Repeatable to: 6 credits.

SOCY898 Pre-Candidacy Research (1-8 Credits)

SOCY899 Doctoral Dissertation Research (1-8 Credits)

SPAN - Spanish

SPAN401 Advanced Composition I (3 Credits)
Compositions and essays with emphasis on stylistics, idiomatic and syntactic structures. Organization and writing of research papers.
Prerequisite: SPAN302; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SPAN402 Advanced Composition II (3 Credits)
Compositions and essays with emphasis on stylistics, idiomatic and syntactic structures. Organization and writing of research papers.
Prerequisite: SPAN401; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SPAN406 Don Juan Manuel's Fictional and Historical Prose (3 Credits)
Dedicated to the literary production of an important author. Don Juan Manuel. By examining the interaction among writing, reading and the oral acquisition of knowledge in his works, special attention will be given to how the border between fact and fiction is constructed in the Middle Ages.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN408 Special Topics in Iberian and Latin American Studies (3 Credits)
Special topics in (a) the literature and film of Spain, Spanish-speaking Latin America, and U.S. Latina/o communities; (b) Spanish linguistics; and (c) Spanish, Latin American, and U.S. Latino cultural studies. Each topic will be announced when the course is offered.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN412 Women in the Middle Ages: Myths and Daily Life (3 Credits)
Explores the role of women during the Middle Ages and analyzes the active participation of women in a society in which men's occupation was warfare. Also explores "feminine voices" and female representations in the literature of the times.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN413 Libro de Buen Amor (3 Credits)
Literary traditions in the Libro de buen amor.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN417 Practicum in Translation VI (3 Credits)
Translation of complete literary texts from Spanish into English. Evaluation of different versions of the original. Problems of interpretation, literary structure and analysis.
Prerequisite: SPAN316; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SPAN418 Hispanic Literature in Translation (3 Credits)
Repeatable to: 6 credits if content differs.

SPAN422 Intercultural Communication and Negotiation (3 Credits)
Focuses on the relationship of language and culture of those operating in world markets. Particular attention will be given to intercultural communication, linguistic systems, culture specific perceptions of, and negotiation with, the Spanish-speaking world. Taught in Spanish.
Prerequisite: SPAN370 OR SPAN371 OR SPAN373 OR SPAN 374.
Restriction: Junior standing or higher.

SPAN425 Hispanic Linguistics II: Structures of Spanish (3 Credits)
This course begins with an introduction to general concepts in linguistics, from language function and the brain to communication, culture, and thought, and their relation to other disciplines in the social sciences. The main purpose of this course is to provide an overview of Hispanic linguistics through multiple perspectives, while exploring the areas of Spanish morphology, syntax, and semantics. This course will also focus on the structural tendencies of Spanish through a variety of practical activities. Taught in Spanish.
Prerequisite: SPAN303; and SPAN311 or SPAN316 or SPAN325.

SPAN426 Hispanic Linguistics III: Language in Use (3 Credits)
Designed for students without previous experience in Linguistics. Focus on language variation and use, linguistic change, and bilingualism. Taught in Spanish.
Prerequisite: SPAN303; and SPAN311 or SPAN316 or SPAN325. Also offered as: SPAN626.
Credit Only Granted for: SPAN426 or SPAN626.

SPAN427 Visions and Fictions from Spain (3 Credits)
Overview of Spanish Cinema from the end of the 19th century through present day Spain. Exploration of the production of literary and cinematic texts in their sociohistorical, political, religious and cultural contexts. Taught in Spanish.
Prerequisite: SPAN331, SPAN332, or SPAN333; or students who have taken courses with comparable content may contact the department; or permission of ARHU-Spanish & Portuguese Languages & Literatures department. Cross-listed with: CINE427.
Credit Only Granted for: CINE427, FILM427 or SPAN427.
Formerly: FILM427.

SPAN430 Cervantes: Don Quijote (3 Credits)
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN432 Colonial Latin American Literature (3 Credits)
Examines the key themes, writers, literary movements, and cultural debates of the colonial period.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN433 Women and Culture in Colonial Latin America (3 Credits)
Considers questions of women and historical production, women writers in colonial times, and contemporary literary interpretations of colonial realities. Debates the continued legacy of female archetypes from the colonial period to the present, and epistemological questions regarding the production of knowledge.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN435 Ecuador: Andean Spaces-Traversing the Colonial City and the Natural World (3 Credits)
Introduces students to the history and cultures of Ecuador from the colonial period to the beginning of the 19th century. By studying the socio-spatial configuration of the colonial city as exemplified by Quito, students will be immersed in the art, architecture, and other rich cultural legacies of Ecuador. Quito, a World Heritage site, offers students visually stunning churches, monasteries, colonial squares, a famed tradition of Baroque painting and sculptures, and vibrant indigenous and mestizo communities. As a contrast, students will explore also travel narratives that represent the natural Andean world while visiting Quito's surrounding areas. This course will interrogate the European influence on urban design and representations of the landscape of the Americas. Understanding this colonial past enhances the understanding of the modern history of the Andean region and Latin America as a whole. The students will gain a full appreciation of the European and Indigenous living heritage that composes the region today. Taught in English.Cross-listed with: ARTH472.
Credit Only Granted for: SPAN435, SPAN448E, ARTH472 or ARTH369E.
Formerly: SPAN448E and ARTH369E.

SPAN438 Special Topics in Colonial Latin America (3 Credits)
The conquest and colonization of the New World produced a textual corpus of invaluable importance for the foundation of Spanish American literary tradition. Special topics (themes, authors, debates, etc.) relevant to the Colonial period will be addressed.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 9 credits if content differs.

SPAN448 Special Topics in Latin American Civilization (3 Credits)
Intensive independent study of a selected topic related to Latin American civilization.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 6 credits if content differs.

SPAN449 Special Topics in Spanish Civilization (3 Credits)
An intensive study of a selected topic related to Spanish civilization.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 6 credits if content differs.

SPAN450 The Hispanic Caribbean: What is a Beach? (3 Credits)
Explores the Hispanic Caribbean as "island spaces" of multiple migrations and cultural identities, as sites of colonial experiences and post-colonial debates.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Credit Only Granted for: SPAN408C or SPAN450.
Formerly: SPAN408C.

SPAN459 Latin American Women Writers (3 Credits)
Emphasis will be placed on contemporary Latin American women writers.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 9 credits if content differs.

SPAN460 The Sublime and the Grotesque in Spanish Romantic Plays and the Visual Arts (3 Credits)
An exploration of the notions of the sublime and the grotesque in theatrical works as well as in the visual arts of the Romantic movement in Spain. Taught in Spanish.
Prerequisite: SPAN331, SPAN332, SPAN333, SPAN361, SPAN362, or SPAN363; or permission of instructor.

SPAN462 Twentieth Century Drama (3 Credits)
Significant plays of the twentieth century.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN464 Contemporary Spanish Poetry (3 Credits)
Spanish poetry from the generation of 1927 to the present.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN466 The Contemporary Spanish Novel (3 Credits)
The novel and the short story from 1940 to the present.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN468 Modernism and Post-Modernism in Spain and Spanish-America (3 Credits)
A study of the most important works and authors of both movements in Spain and Spanish-America.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 9 credits if content differs.

SPAN469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

SPAN470 Spanish for Business II (3 Credits)
Business Spanish terminology, vocabulary and practices. Emphasis on everyday spoken and written Spanish. Readings and discussions of international topics. Cross-cultural considerations relative to international business operations, including exporting and banking. Taught in Spanish.
Prerequisite: Must have completed SPAN370.
Restriction: Sophomore standing or higher.
Credit Only Granted for: SPAN415 or SPAN470.
Formerly: SPAN415.

SPAN471 United States Latina Fiction (3 Credits)
An introduction to United States latina fiction through the study of short stories, novels, poetry, etc. It explores strategies of representation by women of color.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN473 U.S. Latino Performance (3 Credits)
An introduction to United States Latino Performance texts by Chicano, Nuyorican, Cuban-American, Dominican, Central-American and others.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN474 Central American Literatures, Cultures, and Histories (3 Credits)
An overview of Central American history and cultural production, focusing primarily but not exclusively on literary texts.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN478 Special Topics in United States Latino Cultures (3 Credits)
Explores special topics in US Latino Cultures, ranging from Chicano, Nuyorican, Cuban-American, Dominican, Central-American and other border cultural identities.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.
Repeatable to: 9 credits if content differs.

SPAN479 Honors Thesis (3-6 Credits)
Researching and writing an honors thesis under the direction of a professor.
Restriction: Must be in Spanish and Portuguese Honors.
Repeatable to: 6 credits if content differs.

SPAN488 Spanish-American Fiction (3 Credits)
Representative novels and/or short stories from the Wars of Independence to the present or close analysis of major contemporary works. Subject will be announced each time course is offered.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN489 Spanish-American Fiction (3 Credits)
Representative novels and/or short stories from the Wars of Independence to the present or close analysis of major contemporary works. Subject will be announced each time course is offered.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN495 Honors Reading (3 Credits)
Supervised reading.
Prerequisite: Must be in Spanish and Portuguese Honors; or permission of ARHU-School of Languages, Literatures, and Cultures department.

SPAN498 Spanish-American Poetry (3 Credits)
Main trends, authors and works from the conquest to Ruben Dario.
Prerequisite: SPAN333, SPAN361, SPAN331, SPAN332, SPAN362, or SPAN363.

SPAN605 Teaching Spanish I (1 Credit)
Methods and materials for teaching Spanish in higher education.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Restriction: Must be a Spanish teaching assistant.

SPAN608 Medieval Spanish Literature (3 Credits)
Specific authors, genres, and literary periods studied in depth.

SPAN609 Medieval Spanish Literature (3 Credits)
Specific authors, genres, and literary periods studied in depth.

SPAN610 The History of the Spanish Language (3 Credits)

SPAN611 Current Trends in Hispanic Applied Linguistics (3 Credits)
Introduction to current trends in Hispanic Applied Linguistics, emphasizing learning and teaching in Spanish-language contexts.
Restriction: Permission of ARHU-Spanish & Portuguese Languages & Literatures department.

SPAN613 Bilingualism and Biculturalism in Spanish-Speaking Communities (3 Credits)
Exploration of Latino bilingual and bicultural communities, Spanglish, language variants, U.S. Latina/o literary and cultural production. Spanish highly recommended.
Restriction: Permission of ARHU-Spanish & Portuguese Languages & Literatures department.

SPAN618 Poetry of the Golden Age (3 Credits)
Analyses and studies in depth of specific works of specific poets in the sixteenth and seventeenth centuries.

SPAN619 Poetry of the Golden Age (3 Credits)
Analyses and studies in depth of specific works of specific poets in the sixteenth and seventeenth centuries.

SPAN625 Introduction to Hispanic Linguistics I:Basic Concepts (3 Credits)
Introduction to basic terms and definition in Hispanic Linguistics. Fundamental aspects of phonology, morphology, syntax, semantics, sociolinguistics, and pragmatics.

SPAN626 Hispanic Linguistics II: Language in Use (3 Credits)
This course will focus on issues related to language variation and use with a more in-depth analysis of the semantics, pragmatics, and sociolinguistics of Spanish. Students will be introduced to current research in the fields of dialectology, bilingualism and language policy, and the social aspects of language change. This course will include an analysis of current research as it relates to the field of linguistics and other social sciences.
Prerequisite: SPAN301; or permission of ARHU-School of Languages, Literatures, and Cultures department. Jointly offered with SPAN426.
Credit Only Granted for: SPAN426 or SPAN626.

SPAN628 Seminar: the Golden Age in Spanish Literature (3 Credits)

SPAN629 Seminar: the Golden Age in Spanish Literature (3 Credits)
Specific authors, genres, literary movements and literary periods of the sixteenth and seventeenth centuries studied in depth.

SPAN698 Masterpieces of Hispanic Literatures (3 Credits)
Study of masterpieces of the hispanic literatures, topics, areas of literature and works to vary.
Repeatable to: 6 credits if content differs.

SPAN699 Independent Study in Spanish (1-3 Credits)
This course is designed to provide graduate students an opportunity to pursue independent study under the supervision of a member of the department.
Repeatable to: 3 credits.

SPAN708 The Eighteenth Century (3 Credits)
Specific authors, genres, and literary movements studied in depth.

SPAN718 The Nineteenth Century (3 Credits)
Specific authors, genres, and literary movements studied in depth.

SPAN719 The Nineteenth Century (3 Credits)
Specific authors, genres, and literary movements studied in depth.

SPAN728 The Twentieth Century (3 Credits)
Specific authors, genres and literary movements studied in depth.

SPAN729 The Twentieth Century (3 Credits)
Specific authors, genres and literary movements studied in depth.

SPAN738 The Drama of the Twentieth Century (3 Credits)
Specific authors and movements studied in depth.

SPAN788 Seminar Series in Spanish and Latin American Languages, Literatures, and Cultures (1-2 Credits)
Topics to be announced when course is offered.
Prerequisite: Permission of ARHU-School of Languages, Literatures, and Cultures department.
Repeatable to: 8 credits if content differs.

SPAN798 Open Seminar (3 Credits)

SPAN799 Master's Thesis Research (1-6 Credits)

SPAN808 Colonial Spanish-American Literature (3 Credits)
Didactic and narrative prose and epic, dramatic and lyric poetry; principal works and authors.

SPAN809 Colonial Spanish American Literature (3 Credits)
Didactic and narrative prose; dramatic and lyric poetry.

SPAN818 National Spanish-American Literature (3 Credits)
Characteristics of the national literatures. Romantic and Costumbrista literature. Gauchismo and Indigenismo. Principal works and authors.

SPAN819 National Spanish American Literature (3 Credits)
Characteristics of the national literatures. Romantic and Costumbrista literature. Gauchismo and Indigenismo. Principal works and authors.

SPAN828 Hispanic Poetry of the Nineteenth and Twentieth Centuries (3 Credits)
Specific authors, genres and literary movements studied in depth.

SPAN829 Hispanic Poetry of the Nineteenth and Twentieth Centuries (3 Credits)
Specific authors, genres and literary movements studied in depth.

SPAN898 Pre-Candidacy Research (1-8 Credits)

SPAN899 Doctoral Dissertation Research (1-8 Credits)

SPHL - Public Health

SPHL488 Children's Health and Development Clinic (1-4 Credits)
An opportunity to acquire training and experience in a therapeutically oriented physical education-recreation program for children referred by various education, special education, medical or psychiatric groups.
Prerequisite: Permission of SPHL-School of Public Health.

SPHL498 Special Topics in Public Health (3 Credits)
Topical and interdisciplinary courses of interest to upper level undergraduate students in the field of Public Health not currently covered by the program.
Restriction: Junior standing or higher.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: SPHL498 or SPHL698 of same suffix.

SPHL600 Foundations of Public Health (3 Credits)
An overview of the goals, functions, and methods of public health. After an introduction to the core concepts and tools used in public health research and practice, applications of these methodologies are considered in the context of current controversies/problems in public health. Students work together to develop strategies for prevention and control that taken into consideration different points of view, outside research, and impacts on individuals and communities.
Restriction: Must be a graduate student within the School of Public Health.
Credit Only Granted for: SPHL100, PHSC300 or SPHL600.

SPHL601 Core Concepts in Public Health (1 Credit)
Introduces students to the history, functions, systems, policies, and models of public health practice in the United States and globally. The course offers seminars, interactive activities, and assessments aimed at establishing a baseline understanding of public health necessary for higher level and integrative learning in subsequent public health courses.
Restriction: Must be a Master's of Public Health (MPH) or Master's of Health Administration (MHA) student within the School of Public Health.

SPHL602 Foundations of Epidemiology and Biostatistics (4 Credits)
An introduction to conceptual and practical tools from epidemiology and biostatistics that are necessary for the study of public health problems. Students learn epidemiologic concepts and methods, and basic statistical concepts and procedures used in public health research through applications, hands-on experience, and interpretations of statistical findings.
Recommended: Recommend SPHL603 as a co-requisite course.
Restriction: Must be a graduate student within the School of Public Health.
Credit Only Granted for: SPHL602 or EPIB610 and EPIB650.

SPHL603 Public Health Data Laboratory (1 Credit)
An introduction to the statistical software necessary to implement the epidemiology and biostatistics concepts covered in the course EPIB 602, Foundations of Epidemiology and Biostatistics through hands-on exercises.
Corequisite: SPHL602.
Restriction: Must be a graduate student within the School of Public Health.

SPHL610 Program and Policy Planning, Implementation, and Evaluation (5 Credits)
This second course in the MPH/MHA integrated core sequence will prepare students to engage in the important tasks of assessing population and patient needs, implementing and evaluating culturally appropriate public health programs, policies, and interventions, and pursuing appropriate resources to support activities through the policy process and via effective use of power in the face of competing interests. The course will be a mix of individual and team-based assignments based upon an existing or newly identified problem, in addition to case studies, interactive simulations, and applied writing assignments.
Recommended: Completion of SPHL 601, 602, and 603 with a grade of B- or better in each. Note that completion of SPHL 601, 602, and 603 with a B- or better is a graduation requirement for the MPH/MHA degrees; and concurrent enrollment in SPHL 611.
Restriction: Must be in a graduate student in SPHL-School of Public Health.

SPHL611 Public Health Ethics (1 Credit)
Overview and discussion of ethical issues that face public health practitioners.
Prerequisite: Must have completed SPHL601; or permission of instructor.
Restriction: Must be a graduate student in the School of Public Health.
Credit Only Granted for: EPIB641, KNES689Y, or SPHL611..
Formerly: EPIB641, KNES689Y.

SPHL612 Research Ethics (1 Credit)
Overview and discussion of ethical issues that face public health researchers.
Restriction: Must be a graduate student in the School of Public Health.
Credit Only Granted for: EPIB641, KNES689Y or SPHL612.
Formerly: EPIB641, KNES689Y.

SPHL615 Crises of Aging: Time, Retirement and Widowhood (3 Credits)
A cross-disciplinary and multidisciplinary investigation of phenomena which comprise a significant portion of the issues confronting an older adult's life: (1) introduction to multiple processes of adulthood and aging; (2) the concepts and meaning of time; (3) pre-retirement and retirement adjustments; and (4) loss and widowhood.
Credit Only Granted for: HLHP615 or SPHL615.
Formerly: HLHP615.

SPHL620 Leadership, Teams, and Coalitions: Policy to Advocacy (2 Credits)
Students learn team building, leadership, and advocacy skills through the development and presentation of a policy brief on an urgent public health issue. The class will use a combination of brief lectures, discussions, and planned activities on how to develop a policy briefing. Students will have an inter-professional experience during which they will discuss possible approaches to developing policies on their public health issues while practicing team building skills. Class will culminate with presentation of policy briefs through a persuasive advocacy speech.
Prerequisite: Must have completed SPHL610.
Restriction: Must be a graduate student in the School of Public Health.

SPHL625 Issues of Retirement: Theory and Practice (3 Credits)
Multidisciplinary examination of retirement phenomena, including theories of transition, government and private sector policies, social expectations, physical correlates, personal adjustments, and economic consequences. Emphasis upon research utilization.
Credit Only Granted for: HLHP625 or SPHL625.
Formerly: HLHP625.

SPHL689 Selected Problems in Health, Physical Education and Recreation (1-6 Credits)
Research projects in special areas in health, physical education and/or recreation which have interdisciplinary implications not covered in structured courses.
Formerly: HLHP689.

SPHL698 Special Topics in Public Health (3 Credits)
Topical and interdisciplinary courses of interest to master and doctoral students in the field of Public Health not currently covered by the program.
Prerequisite: Permission of SPHL-School of Public Health.

SPHL780 Interdisciplinary Issues in Aging (3 Credits)
Multidisciplinary approaches to the processes of aging to achieve a more holistic understanding. Pedagogical research dissemination, peer instruction, guest lecturing, and informal discussion. The demonstration of the multilateral nature of growing older. Discussion of cross-disciplinary and interdisciplinary research proposals.
Credit Only Granted for: HLHP780 or SPHL780.
Formerly: HLHP780.

STAT - Statistics and Probability

STAT400 Applied Probability and Statistics I (3 Credits)
Random variables, standard distributions, moments, law of large numbers and central limit theorem. Sampling methods, estimation of parameters, testing of hypotheses.
Prerequisite: 1 course with a minimum grade of C- from (MATH131, MATH141); or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: BMGT231, ENEE324, or STAT400.
Additional Information: Not acceptable toward graduate degrees in MATH/STAT/AMSC.

STAT401 Applied Probability and Statistics II (3 Credits)
Point estimation - unbiased and consistent estimators. Interval estimation. Minimum variance and maximum likelihood estimators. Testing of hypotheses. Regression, correlation and analysis of variance. Sampling distributions. Elements of non-parametric methods.
Prerequisite: 1 course with a minimum grade of C- from (STAT400, STAT410).
Additional Information: Not acceptable toward graduate degrees in MATH/STAT/AMSC.

STAT410 Introduction to Probability Theory (3 Credits)
Probability and its properties. Random variables and distribution functions in one and several dimensions. Moments. Characteristic functions. Limit theorems.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241). Cross-listed with SURV410.
Credit Only Granted for: STAT410 or SURV410.

STAT420 Theory and Methods of Statistics (3 Credits)
Point estimation, sufficiency, completeness, Cramer-Rao inequality, maximum likelihood. Confidence intervals for parameters of normal distribution. Hypothesis testing, most powerful tests, likelihood ratio tests. Chi-square tests, analysis of variance, regression, correlation. Nonparametric methods.
Prerequisite: 1 course with a minimum grade of C- from (SURV410, STAT410). Cross-listed with SURV420.
Credit Only Granted for: STAT420 or SURV420.

STAT426 Introduction to Data Science and Machine Learning (3 Credits)
An introductory course to the recent developments in the fields of data science and machine learning. Emphasis will be given to mathematical and statistical understanding of commonly used methods and processes.
Prerequisite: Minimum grade of C- in MATH241 or MATH340; and minimum grade of C- in MATH240, MATH461 or MATH341; and minimum grade of C- in STAT400 or STAT410; students who have taken courses with content comparable to STAT400/410 may request permission of the instructor.
Credit Only Granted for: STAT426 or CMSC320.

STAT430 Introduction to Statistical Computing with SAS (3 Credits)
Descriptive and inferential statistics. SAS software: numerical and graphical data summaries; merging, sorting and splitting data sets. Least squares, regression, graphics and informal diagnostics, interpreting results. Categorical data, lifetime data, time series. Applications to engineering, life science, business and social science.
Prerequisite: 1 course with a minimum grade of C- from (STAT400, STAT410).

STAT440 Sampling Theory (3 Credits)
Simple random sampling. Sampling for proportions. Estimation of sample size. Sampling with varying probabilities. Sampling: stratified, systematic, cluster, double, sequential, incomplete.
Prerequisite: 1 course with a minimum grade of C- from (STAT401, STAT420).
Credit Only Granted for: STAT440 or SURV440.

STAT464 Introduction to Biostatistics (3 Credits)
Probabilistic models. Sampling. Some applications of probability in genetics. Experimental designs. Estimation of effects of treatments. Comparative experiments. Fisher-Irwin test. Wilcoxon tests for paired comparisons.
Prerequisite: Must have completed one semester of calculus.
Restriction: Junior standing or higher.
Credit Only Granted for: BIOE372 or STAT464.
Additional Information: Not acceptable toward degrees in MATH/STAT.

STAT470 Actuarial Mathematics (3 Credits)
Major mathematical ideas involved in calculation of life insurance premiums, including compound interest and present valuation of future income streams; probability distribution and expected values derived from life tables; the interpolation of probability distributions from values estimated at one-year multiples; the 'Law of Large Numbers' describing the regular probabilistic behavior of large populations of independent individuals; and the detailed calculation of expected present values arising in insurance problems.
Prerequisite: 1 course with a minimum grade of C- from (MATH240, MATH461, MATH341); and 1 course with a minimum grade of C- from (MATH340, MATH241).
Recommended: STAT400.

STAT498 Selected Topics in Statistics (1-6 Credits)
Topics of special interest to advanced undergraduate students will be offered occasionally under the general guidance of the MATH/STAT major committee. Students register for reading in statistics under this number.
Restriction: Permission of CMNS-Mathematics department.
Repeatable to: 16 credits.

STAT600 Probability Theory I (3 Credits)
Probability space; distribution functions and densities; Poissson limit theoreom; de Moivre-Laplace theorem; measure-theoretic definition of expectation; classification of measures on R; convergence of random variables; Radon-Nikodym theorem;LP spaces; conditional probabilities; independence of events, sigma-algebras and random variables; Bayes' theo rem; pi-systems and Dynkin systems; discrete Markov chains; random walks; gambler's ruin problem; Markov chains on a general phase space; Borel-cantelli lemmas; Kolmogorov inequality; three series theorem; laws of large numbers.
Prerequisite: STAT410.

STAT601 Probability Theory II (3 Credits)
Weak convergence of measures; characteristic functions; Central Limit Theorem and local limit theorem; stable laws; Kolmogorov consistency theorem (without proof); conditional expectations and martingales; optimal stopping theorem; convergence of martingales; Brownian motion; Markov processes and families; stochastic integral and Ito formula.
Prerequisite: STAT600.

STAT650 Applied Stochastic Processes (3 Credits)
Basic concepts of stochastic processes. Markov processes (discrete and continuous parameters), Random walks, Poisson processes, Birth and death processes. Renewal processes and basic limit theorems. Discrete time martingales, stopping times, optional sampling theorem. Applications from theories of stochastic epidemics, survival analysis and others.
Prerequisite: STAT410; or students who have taken courses with comparable content may contact the department.

STAT658 Advanced Applied Stochastic Processes II (3 Credits)
Advanced topics in applied stochastic processes, rotating among the headings of queueing theory, population proceses, and regenerative phenomena. Course includes disucssion of stochastic models and fields of application, Markov process theory including calculation and characterization of stationary distributions and diffusion approximations, renewal theory and Wiener-Hopf factorization theory.
Prerequisite: STAT650; and must have completed a graduate course in analysis. Or permission of instructor.
Recommended: STAT601 and STAT600.
Repeatable to: 6 credits if content differs.

STAT689 Research Interactions in Statistics (1-3 Credits)
The students participate in a vertically integrated (undergraduate, graduate and/or postdoctoral, faculty) research group. Format varies, but includes regular meetings, readings and presentations of material. See graduate program's online syllabus or contact the graduate program director for more information.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

STAT698 Selected Topics in Probability (1-4 Credits)

STAT700 Mathematical Statistics I (3 Credits)
Sampling distributions including noncentral chi-squared, t, F. Exponential families, completeness. Sufficiency, factorization, likelihood ratio. Decision theory, Bayesian methods, minimax principle. Point estimation. Lehmann-Scheffe and Cramer-Rao theorems. Set estimation.
Prerequisite: STAT410; or students who have taken courses with comparable content may contact the department.

STAT701 Mathematical Statistics II (3 Credits)
Testing hypotheses: parametric methods. Neyman-Pearson lemma. Uniformly most powerful tests. Unbiased tests. Locally optimal tests. Large sample theory, asymptotically best procedures. Nonparametric methods, Wilcoxon, Fisher-Yates, median tests. Linear models, analysis of variance, regression and correlation. Sequential analysis.
Prerequisite: STAT700; or students who have taken courses with comparable content may contact the department.

STAT702 Survival Analysis (3 Credits)
Concepts/definitions of survival functions, hazard rate or hazard function, cumulative hazard functions, mean residual life, inversion formulas; Parametric models: exponential distribution, Weibull distribution; Censored/incomplete data and real data examples; right censored data, doubly censored data, interval censored data, truncated data; Nonparametric maximal likelihood estimator for the lifetime distribution under different types of censoring (e.g., Kaplan-Meier estimator), self-consistency estimators, the EM algorithm, applications of the empirical likelihood; Semiparametric models: accelerated lifetime model, proportional hazard model, the Cox model; Goodness of fit tests and diagnostic methods for model checking.
Prerequisite: STAT410 and STAT420; or students who have taken courses with comparable content may contact the department; or permission of instructor.

STAT705 Computational Statistics (3 Credits)
Modern methods of computational statistics and their application to both practical problems and research. S-Plus and SAS programming with emphasis on S-Plus. S-Plus objects and functions, and SAS procedures. Topics include data management and graphics, Monte Carlo and simulation, bootstrapping, numerical optimization in statistics, linear and generalized linear models, nonparametric regression, time series analysis.
Prerequisite: STAT700 or STAT420.
Recommended: Have some programming experience (any language).
Credit Only Granted for: STAT705 or STAT798C.
Formerly: STAT798C.

STAT730 Time Series Analysis (3 Credits)
The methodology of probabilistic description and statistical analysis of (primarily stationary) random sequences and processes. Correlation functions, Gaussian processes, Hilbert-space methods including Wold decomposition and spectral representation, periodogram and estimation of spectral densities, parameter estimation and model identification for ARMA processes, linear filtering, Kalman-Bucy filtering, sampling theorems for continuous-time series, multivariate time series.
Prerequisite: STAT700; and must have completed a graduate course in analysis. Or permission of instructor.
Recommended: STAT701 and STAT650.

STAT740 Linear Statistical Models I (3 Credits)
Least squares, general linear models, estimability and Gauss-Markov theorem. Simple and multiple linear regression, analysis of residuals and diagnostics, polynomial models, variable selection. Qualitative predictors, one and two way analysis of variance, multiple comparisons, analysis of covariance. Nonlinear least squares. High-level statistical computer software will be used for data analysis throughout the course.
Prerequisite: STAT700 or STAT420.

STAT741 Linear Statistical Models II (3 Credits)
Continuation of STAT 740. Multiway layouts, incomplete designs, Latin squares, complete and fractional factorial designs, crossed and nested models. Balanced random effects models, mixed models, repeated measures.General mixed model, computational algorithms, ML and REML estimates. Generalized linear models, logistic and loglinear regression.
Prerequisite: STAT740.

STAT750 Multivariate Analysis (3 Credits)
Multivariate normal, Wishart's and Hotelling's distributions. Tests of hypotheses, estimation. Generalized distance, discriminant analysis. Regression and correlation. Multivariate analysis of variance; distribution of test criteria. Principal components, canonical correlations and factor analysis.
Prerequisite: STAT700 or STAT420.

STAT770 Analysis of Categorical Data (3 Credits)
Loglinear and logistic models. Single classification, two-way classification; contingency tables; tests of homogeneity and independence models, measures of association, distribution theory. Bayesian methods. Incomplete contingency tables. Square contingency tables - symmetry. Extensions to higher dimensional contingency tables.
Prerequisite: STAT430 and STAT420; or permission of CMNS-Mathematics department.

STAT798 Selected Topics in Statistics (1-4 Credits)

STAT799 Master's Thesis Research (1-6 Credits)

STAT808 Selected Topics in Probability (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

STAT818 Selected Topics in Statistics (1-3 Credits)
Advanced topics of current interest.
Restriction: Permission of instructor.
Repeatable to: 18 credits.

STAT898 Pre-Candidacy Research (1-8 Credits)

STAT899 Doctoral Dissertation Research (1-8 Credits)

SURV - Survey Methodology

SURV400 Fundamentals of Survey and Data Science (3 Credits)
The course introduces the student to a set of principles of survey and data science that are the basis of standard practices in these fields. The course exposes the student to key terminology and concepts of collecting and analyzing data from surveys and other data sources to gain insights and to test hypotheses about the nature of human and social behavior and interaction. It will also present a framework that will allow the student to evaluate the influence of different error sources on the quality of data.
Prerequisite: STAT100; or permission of BSOS-Joint Program in Survey Methodology department.
Restriction: Course open to SURV certificate students, SURV Advanced Special Students, and SURV undergraduate minors. Graduate students from other departments may enroll with permission from the department.
Credit Only Granted for: SURV699M or SURV400.
Formerly: SURV699M.

SURV410 Introduction to Probability Theory (3 Credits)
Probability and its properties. Random variables and distribution functions in one and several dimensions. Moments. Characteristic functions. Limit theorems.
Prerequisite: MATH240, MATH341, or MATH461; and (MATH241 or MATH340). Cross-listed with STAT410.
Credit Only Granted for: STAT410 or SURV410.

SURV420 Theory and Methods of Statistics (3 Credits)
Point estimation, sufficiency, completeness, Cramer-Rao inequality, maximum likelihood. Confidence intervals for parameters of normal distribution. Hypothesis testing, most powerful tests, likelihood ratio tests. Chi-square tests, analysis of variance, regression, correlation. Nonparametric methods.
Prerequisite: SURV410 or STAT410. Cross-listed with STAT420.
Credit Only Granted for: STAT420 or SURV420.

SURV430 Fundamentals of Questionnaire Design (3 Credits)
Introduction to the scientific literature on the design, testing and evaluation of survey questionnaires, together with hands-on application of the methods discussed in class.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.
Credit Only Granted for: SURV430 or SURV630.

SURV440 Sampling Theory (3 Credits)
Simple random sampling, sampling for proportions, estimation of sample size, sampling with varying probabilities of selection, stratification, systematic selection, cluster sampling, double sampling, and sequential sampling.
Prerequisite: STAT401 or STAT420.
Credit Only Granted for: STAT440 or SURV440.

SURV600 Fundamentals of Survey and Data Science (3 Credits)
Introduces the student to a set of principles of survey and data science that are the basis of standard practices in these fields. The course exposes the student to key terminology and concepts of collecting and analyzing data from surveys and other data sources to gain insights and to test hypotheses about the nature of human and social behavior and interaction. It will also present a framework that will allow the student to evaluate the influence of different error sources on the quality of data.
Prerequisite: Any University of Maryland approved college-level statistics course.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department; and must have graduate student status.
Credit Only Granted for: SURV699M, SURV400 or SURV600.

SURV615 Statistical Modeling and Machine Learning I (3 Credits)
This is the first course in a two-term sequence in applied statistical methods and machine learning that are the basis in handling complex datasets. The topics covered include: overview on the quantitative research, linear regression, analysis of variance, inference, prediction, model diagnostics and selection and resampling methods. The emphasis will be to understand and apply the methods.
Prerequisite: Must have basic R Programming skills; and must have completed a two course sequence in probability and statistics; or students who have comparable content may contact the department for permission.
Restriction: Must be in Survey Methodology (Master's) program; or permission of instructor.

SURV616 Statistical Modeling and Machine Learning II (3 Credits)
Build on material presented in Statistical Methods and Machine Learning I. Topics include: categorical data analysis, logistic regression, model selection for inference and prediction, classification using K-means and neural networks, survival analysis, principal components, and factor analysis.
Prerequisite: SURV615.

SURV617 Applications of Statistical Modeling (3 Credits)
Designed for students on both the social science and statistical tracks for the two programs in survey methodology, will provide students with exposure to applications of more advanced statistical modeling tools for both substantive and methodological investigations that are not fully covered in other MPSM or JPSM courses. Modeling techniques to be covered include multilevel modeling (with an application to methodological studies of interviewer effects), structural equation modeling (with an application of latent class models to methodological studies of measurement error), classification trees (with an application to prediction of response propensity), and alternative models for longitudinal data (with an application to panel survey data from the Health and Retirement Study). Discussions and examples of each modeling technique will be supplemented with methods for appropriately handling complex sample designs when fitting the models. The class will focus on practical applications and software rather than extensive theoretical discussions.
Prerequisite: SURV615 and SURV616; or permission of instructor.
Credit Only Granted for: SURV617, SURV746, or SURV699R.
Formerly: SURV699R and SURV746.

SURV621 Fundamentals of Data Collection I (3 Credits)
First semester of a two-semester sequence that provides a broad overview of the processes that generate data for use in social science research. Students will gain an understanding of different types of data and how they are created, as well as their relative strengths and weaknesses. A key distinction is drawn between data that are designed, primarily survey data, and those that are found, such as administrative records, remnants of online transactions, and social media content. The course combines lectures, supplemented with assigned readings, and practical exercises. In the first semester, the focus will be on the error that is inherent in data, specifically errors of representation and errors of measurement, whether the data are designed or found. The psychological origins of survey responses are examined as a way to understand the measurement error that is inherent in answers. The effects of the mode of data collection (e.g., mobile web versus telephone interview) on survey responses also are examined.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV622 Fundamentals of Data Collection II (3 Credits)
This is the second course in a two-semester sequence that provides a broad overview of the processes that generate data for use in social science research. Students will gain an understanding of different types of data and how they are created, as well as their relative strengths and weaknesses. A key distinction is drawn between data that are designed, primarily survey data, and those that are found, such as administrative records, remnants of online transactions, and social media content. The course combines lectures, supplemented with assigned readings, and practical exercises. The second semester builds on the discussion of survey mode during the first semester, considering the role played by interviewers in telephone and in-person surveys and their effects on the data collected. Students next are introduced to the methods for extracting and re purposing found data for social science research. Methods for the classification of text, with an emphasis on automated coding methods, are introduced and selected applications considered (e.g., coding of open-ended survey responses, classification of the sentiments expressed in social media posts). Issues in using survey data and administrative records to measure change over time (longitudinal comparisons) are explored. The term concludes with an examination of methods for evaluating the quality of both designed and found data.
Prerequisite: Permission of Instructor required; or fundamentals of Data Collection I.

SURV623 Data Collection Methods in Survey Research (3 Credits)
Review of alternative data collection methods used in surveys, such as current advances in computer-assisted telephone interviewing (CATI), computer-assisted personal interviewing (CAPI), and other methods such as touchtone data entry (TDE) and voice recognition (VRE).
Prerequisite: SURV400; or students who have taken courses with comparable content may contact the department.

SURV624 Privacy Law (1 Credit)
To acquaint the students with the origins and basic principles of privacy law mainly in Europe. Furthermore, it will contrast the European privacy foundations with the U.S. approach. At the core of this course stands the new European General Data Protection Regulation (GDPR) and its applicability to specific cases and basic principles. Moreover, the course will cover current challenges to the existing privacy paradigms by big data and big data analytics.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV625 Applied Sampling (3 Credits)
Practical aspects of sample design. Topics include: probability sampling (including simple random, systematic, stratified, clustered, multistage and two-phase sampling methods), sampling with probabilities proportional to size, area sampling, telephone sampling, ratio estimation, sampling error estimation, frame problems, nonresponse, and cost factors.
Prerequisite: Must have completed a course in statistics approved by department.

SURV626 Sampling (2 Credits)
Practical aspects of sample design. The course will cover the main techniques used in sampling practice: simple random sampling, stratification, systematic selection, cluster sampling, multistage sampling, and probability proportional to size sampling. The course will also cover sampling frames, cost models, and sampling error (variance) estimation techniques.
Prerequisite: Permission of BSOS-Joint Program in Survey Methodology department; and must have completed an introductory graduate level statistics course covering material through OLS and logistic regression.

SURV627 Experimental Design for Surveys (2 Credits)
A key tool of methodological research is the split-ballot experiment, in which randomly selected subgroups of a sample receive different questions, different response formats, or different modes of data collection. In theory, such experiments can combine the clarity of experimental designs with the inferential power of representative samples. All too often, though, such experiments use flawed designs that leave serious doubts about the meaning or generalization of the findings. The purpose of this course is to consider the issues involved in the design and analysis of data from experiments embedded in surveys. It covers the purposes of experiments in surveys, examines several classic survey experiments in detail, and takes a close look at some of the pitfalls and issues in the design of such studies. These pitfalls include problem, such as the confounding of the experimental variables, that jeopardize the comparability of the experimental groups, problems, such as non response, that cast doubts on the generality of the results, and problems in determining the reliability of the results. The course will also consider some of the design decisions that almost always arise in planning experiments; issues such as identifying the appropriate error term for significance tests and including necessary comparison groups.
Prerequisite: At least one prior course in data analysis.
Recommended: Experience in the use of SAS or STATA statistical analysis software.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV630 Questionnaire Design and Evaluation (3 Credits)
The stages of questionnaire design; developmental interviewing, question writing, question evaluation, pretesting, and questionnaire ordering and formatting. Reviews of the literature on questionnaire construction, the experimental literature on question effects, and the psychological literature on information processing. Examination of the diverse challenges posed by self versus proxy reporting and special attention is paid to the relationship between mode of administration and questionnaire design.
Credit Only Granted for: SURV430 and SURV630.

SURV631 Questionnaire Design (2 Credits)
This course introduces students to the stages of questionnaire development. The course reviews the scientific literature on questionnaire construction, the experimental literature on question effects, and the psychological literature on information processing. It will also discuss the diverse challenges posed by self- versus proxy-reporting and special attention is paid to the relationship between mode of administration and questionnaire design. Students will also get hands-on experience in developing their own questionnaire.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV632 Cognition, Communication and Survey Measurement (3 Credits)
Major sources of survey error-such as reporting errors and nonresponse bias-from the perspective of social and cognitive psychology and related disciplines. Topics: psychology of memory and its bearing on classical survey issues (e.g., underreporting and telescoping); models of language use and their implications for the interpretation and misinterpretation of survey questions; and studies of attitudes, attitude change, and their possible application to increasing response rates and improving the measurement of opinions. Theories and findings from the social and behavioral sciences will be explored.

SURV635 Usability Testing for Survey Research (1 Credit)
Introduces the concepts of usability and usability testing and why they are needed for survey research. The course provides a theoretical model for understanding the respondent-survey interaction and then provides practical methods for incorporating iterative user-centered design and testing into the survey development process. The course provides techniques and examples for designing, planning, conducting and analyzing usability studies on web or mobile surveys
Recommended: Students should be familiar with the basics of questionnaire design. Experience with cognitive testing is a plus, but not a requirement.
Restriction: Must be in a major within the BSOS-Joint Program in Survey Methodology department; or permission of BSOS-Joint Program in Survey Methodology department.

SURV636 Sampling II (1 Credit)
Different applications of the methods and techniques covered in the Sampling I course. This is also an applied statistics methods course concerned almost exclusively with the design of data collection rather than data analysis. The course will concentrate on sampling applications to human populations, since this poses a number of particular problems not found in sampling of other types of units. The principles of sample selection, though, can be applied to many other types of populations.
Prerequisite: SURV626 or equivalent.
Recommended: Some experience with the R statistical computing software.
Repeatable to: 1 credit.

SURV640 Survey Practicum I (2 Credits)
First part of an applied workshop in sample survey design, implementation, and analysis. Problems of moving from substantive concepts to questions on a survey questionnaire, designing a sample, pretesting and adminstering the survey.
Restriction: Must be in one of the following programs (Survey Methodology (Doctoral); Survey Methodology (Master's)) ; or permission of instructor.
Credit Only Granted for: SURV620 or SURV640.
Formerly: SURV620.
Additional Information: SURV640 and SURV641 must be taken in consecutive semesters.

SURV641 Survey Practicum II (2 Credits)
Second part of applied workshop in sample survey design. Course focus on post data collection process of data processing, editing and anlysis.
Prerequisite: SURV620.
Restriction: Must be in one of the following programs (Survey Methodology (Doctoral); Survey Methodology (Master's)).
Credit Only Granted for: SURV621 or SURV641.
Formerly: SURV621.
Additional Information: SURV640 and SURV641 must be taken in consecutive semesters.

SURV642 Project Consulting (6 Credits)
Students will apply the core skills that they learned in the IPSDS program to address real-world problems. The course will provide experience with the steps involved in carrying out a data consulting project, such as discussing the problems to solve with a client, data handling, and communicating work in both written and oral forms. The project is completed in teams (3-4 students per team).
Prerequisite: SURV703; and background knowledge in programming in Python and SQL structures.
Recommended: SURV736.

SURV650 Economic Measurement (3 Credits)
An introduction to the field of economic measurement. Sound economic data are of critical importance to policymakers, the business community, and others. Emphasis is placed on the economic concepts that underlie key economic statistics and the translation of those concepts into operational measures. Topics addressed include business survey sampling; the creation of business survey sampling frames; the collection of data from businesses; employment and earnings statistics; price statistics; output and productivity measures; the national accounts; and the statistical uses of administrative data. Lectures and course readings assume prior exposure to the tools of economic analysis.
Prerequisite: Must have completed a course in intermediate microeconomics.
Credit Only Granted for: SURV650 or SURV699L.
Formerly: SURV699L.

SURV656 Web Survey Methodology (1 Credit)
Fundamental concepts of web surveys and web survey design. The course is organized in 3 main sections which follow the way a proper web survey is organized: prefielding, fielding and post fielding.
Prerequisite: Must have completed SURV400; or must have completed SURV623; or permission of instructor. And permission of BSOS-Joint Program in Survey Methodology department.

SURV665 Introduction to Real World Data Management (2 Credits)
Data is omnipresent in the contemporary world coming in different shapes and sized: from survey data to found data. In order to make use of such data through analysis it is necessary first to import and clean it. This is often one of the most time consuming and difficult parts of data analysis. In this course you will learn both the conceptual steps needed in preparing data for analysis as well as the practical skills to do this. The course will cover all the essential skills needed to prepare data be it survey data, administrative data or found data.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV667 Introduction to Record Linkage with Big Data Applications (2 Credits)
Methods to combine data on given entities (people, households, firms etc.) that are stored in different data sources. By showing the strengths of these methods and by showing how each of them are performed in practice using R, the course will demonstrate the various benefits of record linkage. Participants will also learn about potential challenges that record linkage projects may face.
Prerequisite: Basic statistical concepts; and intermediate knowledge of R.
Recommended: Familiarity with regular expressions, the R packages ggplot2 and tidyverse.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV672 Introduction to the Federal Statistical System and the Survey Research Profession (1 Credit)
The U.S. statistical system and its goals are reviewed. The federal statistical agencies are described, and their primary missions and data collections are examined. The statistical systems of other countries are compared with the U.S. system. Organizational and budgetary aspects are presented. Students will learn about organizations and groups outside of the Federal Statistical System that affect the actions of the System. These include other governmental units, professional associations, and advisory groups created by the agencies themselves. Students will review current laws regarding privacy and confidentiality affecting government agency work and consider a variety of ethical issues confronting government statisticians.
Credit Only Granted for: (SURV670 and SURV671) or SURV672.
Formerly: SURV670 and SURV671.

SURV673 Introduction to Python and SQL (1 Credit)
Basics of Python and SQL for data analysis.Students will explore real publicly-available datasets, using the data analysis toolsin Python to create summaries and generate visualizations. Students will learn thebasics of database management and organization, as well as learn how to code inSQL and work with PostgreSQL databases. By the end of the class, students shouldunderstand how to read in data from CSV files or from the internet and becomfortable using either SQL or Python to aggregate, summarize, describe, andvisualize these datasets.
Recommended: Background knowledge in programming in Python and SQL structures.

SURV699 Special Topics in Survey Methodology (1-6 Credits)
Credit according to time scheduled and organization of the course. Organized as a lecture series on specialized advanced topics in survey methodology.
Prerequisite: Must have completed a graduate-level course in statistics or quantitive methods; and must have familiarity with survey research methods.

SURV701 Analysis of Complex Sample Data (3 Credits)
Analysis of data from complex sample designs covers: the development and handling of selection and other compensatory weights; methods for handling missing data; the effect of stratification and clustering on estimation and inference; alternative variance estimation procedures; methods for incorporating weights, stratification and clustering, and imputed values in estimation and inference procedures for complex sample survey data; and generalized design effects and variance functions. Computer software that takes account of complex sample design in estimation.
Prerequisite: SURV625.

SURV702 Analysis of Complex Survey Data (2 Credits)
The development and handling of selection and other compensatory weights for survey data analysis; the effects of stratification and clustering on survey estimation and inference; alternative variance estimation procedures for estimated survey statistics; methods and computer software that take into account the effects of complex sample designs on survey estimation and inference; and methods for handling missing data, including weighting adjustment and imputation.
Prerequisite: One or more graduate courses in statistics covering techniques through OLS and logistic regression, a course in applied sampling methods.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV703 Computer-Based Content Analysis I (1 Credit)
Investigate the foundations of Natural Language Processing (NLP) as tool for analyzing natural language texts in the social sciences, thus providing an alternative to traditional ways of data generation through surveys. The course introduces general use cases for NLP, provides a guide to standard operations on text as well as their implementation in the Python-based Natural Language Toolkit (NLTK) and introduces the text mining functionalities of the WEKA Machine Learning workbench. The theory part of the course worth one credit can be supplemented by an optional project part worth another credit point.
Prerequisite: Background knowledge in programming in Python and SQL structures.
Recommended: SURV736.

SURV704 Computer-Based Content Analysis II (1 Credit)
Investigates the foundations of Natural Language Processing (NLP) as tool for analyzing natural language texts in the social sciences, thus providing an alternative to traditional ways of data generation through surveys. The course introduces general use cases for NLP, provides a guide to standard operations on text as well as their implementation in the Python-based Natural Language Toolkit (NLTK) and introduces the text mining functionalities of the WEKA Machine Learning workbench. The theory part of the course worth one credit can be supplemented by an optional project part worth another credit point
Prerequisite: SURV703; and background knowledge in programming in Python and SQL structures.
Recommended: SURV736.

SURV706 General Linear Models (2 Credits)
The main focus of this course lies on the introduction to statistical models and estimators beyond linear regression useful to social and economic scientists. It provides an overview of generalized linear models (GLM) that encompass non-normal response distributions to model functions of the mean. GLMs thus relate the expected mean E(Y) of the dependent variable to the predictor variables via a specific link function. This link function permits the expected mean to be non-linearly related to the predictor variables. Examples for GLMs are the logistic regression, regressions for ordinal data, or regression models for count data. GLMs are generally estimated by use of maximum likelihood estimation. The course thus not only introduces GLMs but starts with an introduction to the principle of maximum likelihood estimation.
Recommended: Sound understanding of Linear Regression Models, Calculus and Linear Algebra.
Restriction: Must have permission of BSOS-Joint Program in Survey Methodology.
Credit Only Granted for: SURV706 or SURV699J.
Formerly: SURV699J.

SURV720 Total Survey Error and Data Quality I (2 Credits)
Total error structure of sample survey data, reviewing current research findings on the magnitudes of different error sources, design features that affect their magnitudes, and interrelationships among the errors. Coverage, nonresponse, sampling, measurement, and postsurvey processing errors. For each error source reviewed, social science theories about its causes and statistical models estimating the error source are described. Empirical studies from the survey methodological literature are reviewed to illustrate the relative magnitudes of error in different designs. Emphasis on aspects of the survey design necessary to estimate different error sources. Relationships to show how attempts to control one error source may increase another source. Attempts to model total survey error will be presented.
Prerequisite: SURV625.
Restriction: Permission of instructor.
Credit Only Granted for: (SURV720 and SURV721) or SURV723.
Formerly: SURV723.

SURV721 Total Survey Error and Data Quality II (2 Credits)
Second part of a review of total survey error structure of sample survey data. Reviewing current research findings on the magnitudes of different error sources. Students will continue work on an independent research project which provides empirical investigation of one or more error source. An analysis paper presenting findings of the project will be submitted at the end of the course.
Prerequisite: SURV720.
Restriction: Permission of instructor.
Credit Only Granted for: (SURV720 and SURV721) or SURV723.
Formerly: SURV723.

SURV722 Research Design: Causal inference from randomized and observational data (3 Credits)
Research designs from which causal inferences are sought. Classical experimental design will be contrasted with quasi-experiments, evaluation studies, and other observational study designs. Emphasis placed on how design features impact the nature of statistical estimation and inference from the designs. Issues of blocking, balancing, repeated measures, control strategies, etc.
Restriction: Must be in Survey Methodology (Doctoral) program; or must be in Survey Methodology (Master's) program; or must be in a major within the BSOS-Joint Program in Survey Methodology department; or permission of BSOS-Joint Program in Survey Methodology department.

SURV725 Item Nonresponse and Imputation (1 Credit)
Missing data are a common problem which can lead to biased results if the missingness is not taken into account at the analysis stage. Imputation is often suggested as a strategy to deal with item nonresponse allowing the analyst to use standard complete data methods after the imputation. However, several misconceptions about the aims and goals of imputation make some users skeptical about the approach. In this course we will illustrate why thinking about the missing data is important and clarify which goals a useful imputation method should try to achieve.
Prerequisite: Be comfortable with generalized linear models and basic probability theory through coursework or work experience; and familiarity with the statistical software R.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV726 Multiple Imputation (1 Credit)
This course will provide a detailed introduction to multiple imputation, a convenient strategy for dealing with (item) nonresponse in surveys. We will motivate the concept and illustrate why multiple imputation should generally be preferred over single imputation methods. The main focus of the course will be on strategies to generate (multiple) imputations and how to deal with common problems when applying the methods for large scale surveys. We will also discuss various options for assessing the quality of the imputations. All concepts will be demonstrated using software illustrations in R.
Prerequisite: Be comfortable with generalized linear models and basic probability theory through coursework or work experience; and familiarity with the statistical software R; and must have completed Surv 725 Item Nonresponse and Imputation or be familiar with the content through relevant work experience.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV727 Fundamentals of Computing and Data Display (3 Credits)
The first part of this course provides an introduction to web scraping and APIs for gathering data from the web and then discusses how to store and manage (big) data from diverse sources efficiently. The second part of the course demonstrates techniques for exploring and finding patterns in (non-standard) data, with a focus on data visualization. The course focuses on R as the primary computing environment, with excursus into SQL and Big Data processing tools.
Restriction: Must be in a major within the BSOS-Joint Program in Survey Methodology department; or permission of BSOS-Joint Program in Survey Methodology department.
Additional Information: Students without any R knowledge are encouraged to work through one or more R web tutorials prior or during the first weeks of the course.

SURV730 Measurement Error Models (1 Credit)
Measurement error in survey data can significantly distort analyses of substantive interest. Means, totals, and proportions will be off if the average answer people give is inaccurate. However, measurement error distorts not only estimates of means but can also severely bias apparent relationships, conditional probabilities, means differences, and other regression-type analyses. To remove such biases it is therefore essential to estimate the extent of measurement error in survey variables. This can be done using a gold standard or, in the absence of such a standard, modeling the error. This course introduces the latter and trains students to perform regression analyses without the influence of measurement error.
Prerequisite: SURV623 or SURV630; or have equivalent survey research experience. And must have completed a basic statistics course in regression modeling.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV732 Practical Inference from Complex Surveys (2 Credits)
Inference from complex sample surveys covers the theoretical and empirical properties of various variance estimation strategies (e.g., Taylor series approximation, replicated methods, and bootstrap methods for complex sample designs) and how to incorporate those methods into inference for complex sample survey data. Variance estimation procedures are applied to descriptive estimators and to analysis techniques such as regression and analysis of variance. Generalized variances and design effects are presented. Methods of model-based inference for complex sample surveys are also discussed, and the results contrasted to the design-based type of inference used as the standard in the course. The course will use real survey data to illustrate the methods discussed in class. Students will learn the use of computer software that takes account of the sample design in estimation.
Prerequisite: SURV440, SURV626, STAT401, or SURV699J; or permission of BSOS-Joint Program in Survey Methodology.
Recommended: A sound understanding of linear regression models (OLS), knowledge in linear algebra and calculus is important, as is previous exposure to complex sample designs and common estimation procedures. Previous exposure to maximum likelihood estimation is assumed, but students may meet this requirement by taking the course b online program previously or concurrently.

SURV735 Data Confidentiality and Statistical Disclosure Control (2 Credits)
This course will provide a gentle introduction to statistical disclosure control with a focus on generating synthetic data for maintaining the confidentiality of the survey respondents. The first part of the course will introduce several traditional approaches for data protection that are widely used at statistical agencies. Some limitations of these approaches will also be discussed. The second part of the course will introduce synthetic data as a possible alternative. This part of the course will discuss different approaches to generating synthetic datasets in detail. Possible modeling strategies and analytical validity evaluations will be assessed and potential measures to quantify the remaining risk of disclosure will be presented. To provide the participants with hands on experience, all steps will be illustrated using simulated and real data examples in R.
Prerequisite: Must have familiarity with the statistical software R; and must have completed a basic statistics course in regression modeling.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV736 Introduction to Web Scraping with R (1 Credit)
Provides a condensed overview of web technologies and techniques to collect data from the web in an automated way. To this end, students will use the statistical software R. The course introduces fundamental parts of web architecture and data transmission on the web. Furthermore, students will learn how to scrape content from static and dynamic web pages and connect to APIs from popular web services. Finally, practical and ethical issues of web data collection are discussed.
Prerequisite: Students are expected to be familiar with the statistical software R.
Recommended: Knowledge about the ?tidyverse? packages, in particular, dplyr, plyr, magrittr, and stringr.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV740 Fundamentals of Inference (3 Credits)
Focuses on the fundamentals of statistical inference in the finite population setting. Overview and review fundamental ideas of making inferences about populations. Basic principles of probability sampling; focus on differences between making predictions and making inferences; explore the differences between randomized study designs and observational studies; consider model-based vs. design-based analytic approaches; review techniques designed to improve efficiency using auxiliary information; and consider non-probability sampling and related inferential techniques.
Prerequisite: SURV410 and SURV420; or (SURV615 and SURV616); or permission of Instructor required.
Restriction: Must be in a major within the BSOS-Joint Program in Survey Methodology department; or permission of BSOS-Joint Program in Survey Methodology department.

SURV742 Inference from Complex Surveys (3 Credits)
Inference from complex sample survey data covering the theoretical and empirical properties of various variance estimation strategies (e.g., Taylor series approximation, replicated methods, and bootstrap methods for complex sample designs). Incorporation of those methods into inference for complex sample survey data. Variance estimation procedures applied to descriptive estimators and to analysis of categorical data. Generalized variances and design effects presented. Methods of model-based inference for complex sample surveys examined, and results contrasted to the design-based type of inference used as the standard in the course. Real survey data illustrating the methods discussed. Students will learn the use of computer software that takes account of the sample design in estimation.
Prerequisite: SURV440.

SURV744 Topics in Survey Methodology (3 Credits)
Advanced course in survey sampling theory.
Prerequisite: SURV440.

SURV745 Practical Tools for Sampling and Weighting (3 Credits)
A statistical methods class appropriate for second year Master's students and PhD students. The course will be a combination of hands-on applications and general review of the theory behinddifferent approaches to sampling and weighting. Topics covered include sample size calculations using estimation targets based on relative standard error, margin of error, and power requirements. Use of mathematical programming to determine sample sizes needed to achieve estimation goals for a series of subgroups and analysis variables. Resources for designing area probability samples. Methods of sample allocation for multistage samples. Steps in weighting, including computation of base weights, non response adjustments, and uses of auxiliary data. Non response adjustment alternatives, including weighting cell adjustments, formation of cells using regression trees, and propensity score adjustments. Weighting via post stratification, raking, general regression estimation, and other types of calibration.
Prerequisite: SURV615, SURV616, and SURV625; or permission of instructor.
Credit Only Granted for: SURV745 or SURV699E.
Formerly: SURV699E.

SURV747 Practical Tools for Sampling and Weighting Part I (2 Credits)
A statistical methods class appropriate for second year Master's students and PhD students. The course will be a combination of hands-on applications and general review of the theory behind different approaches to sampling and weighting. Topics covered include sample size calculations using estimation targets based on relative standard error, margin of error, and power requirements. Use of mathematical programming to determine sample sizes needed to achieve estimation goals for a series of subgroups and analysis variables. Resources for designing area probability samples. Methods of sample allocation for multistage samples. Base weights are discussed in context of the sample designs chosen.Note: Part II of the course will provide a more in-depth discussion on weighting.
Prerequisite: Sampling theory (e.g., SURV440 or equivalent) and Applied sampling (e.g., SURV626 or equivalent).
Recommended: Experience in the use of statistical software package R.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV750 Step by Step Survey Weighting (1 Credit)
Learn to calculate analysis weights for various survey designs in a real-world setting. We will cover topics on calculating base weights for single- and multistage designs, adjusting weights for unknown study eligibility and nonresponse using a few techniques, and aligning survey estimates with known population values through weight calibration. We will use specialized software for the procedures mentioned. This course will emphasize R but some examples in SAS and Stata are also discussed.
Prerequisite: SURV440, or course in sampling theory; and SURV626, or course in applied sampling.
Recommended: Some experience with variance estimation (e.g., SURV742), statistical analysis using survey data, and the R statistical computing software.

SURV751 Introduction to Big Data and Machine Learning (1 Credit)
This is an introduction to the uses and methods of working with Big data. Students explore how Big Data concepts, processes and methods can be used within the context of Survey Research.
Prerequisite: Familiarity with the statistical software R.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.
Additional Information: Familiarity with model building and model selection as well as the R program is not required but could also be helpful. Students without prior knowledge in R should plan on using free online resources to make themselves familiar with the basics of this statistical programming language.

SURV752 Introduction to Data Visualization (1 Credit)
Data visualization is one of the most powerful tools to explore, understand and communicate patterns in quantitative information. At the same time, good data visualization is a surprisingly difficult task and demands three quite different skills: substantive knowledge, statistical skill, and artistic sense. The course is intended to introduce participants to a) key principles of analytic design and useful visualization techniques for the exploration and presentation of univariate and multivariate data. This course is highly applied in nature and emphasizes the practical aspects of data visualization in the social sciences. Students will learn how to evaluate data visualizations based on principles of analytic design, how to construct compelling visualizations using the free statistics software R, and how to explore and present their data with visual methods.
Prerequisite: Basic statistics understanding and bivariate linear regression.
Recommended: Experience in the use of statistical software package R.
Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

SURV753 Machine Learning II (2 Credits)
Social scientists and survey researchers are confronted with an increasing number of new data sources such as apps and sensors that often result in (para)data structures that are difficult to handle with traditional modeling methods. At the same time, advances in the field of machine learning (ML) have created an array of flexible methods and tools that can be used to tackle a variety of modeling problems. Against this background, this course discusses advanced ML concepts such as cross validation, class imbalance, Boosting and Stacking as well as key approaches for facilitating model tuning and performing feature selection. In this course we also introduce additional machine learning methods including Support Vector Machines, Extra-Trees and LASSO among others. The course aims to illustrate these concepts, methods and approaches from a social science perspective. Furthermore, the course covers techniques for extracting patterns from unstructured data as well as interpreting and presenting results from machine learning algorithms. Code examples will be provided using the statistical programming language R.
Prerequisite: SURV751; or comparable knowledge or experience.
Recommended: Familiarity with the statistical programming language R.

SURV760 Survey Management (3 Credits)
Modern practices in the administration of large scale surveys. Alternative management structures for large field organizations, supervisory and training regimens, handling of turnover, and multiple surveys with the same staff. Practical issues in budgeting of surveys are reviewed with examples from actual surveys. Scheduling of sequential activities in the design, data collection, and processing of data is described.

SURV772 Survey Design Seminar (3 Credits)
Students present solutions to design issues presented to the seminar. Readings are selected from literatures not treated in other classes and practical consulting problems are addressed.
Credit Only Granted for: (SURV770 and SURV771) or SURV772.
Formerly: SURV770 and SURV771.

SURV798 Advanced Topics in Survey Methodology (3 Credits)
Individual instruction.
Repeatable to: 12 credits if content differs. Cross-listed with STAT798.
Credit Only Granted for: STAT798 or SURV798.

SURV819 Doctoral Research Seminar in Survey Methodology (1-6 Credits)
This is the first, two term seminar introducing the doctoral student to areas of integration of social science and statistical science approaches in the design, collection, and analysis of surveys.
Restriction: Permission of instructor.

SURV829 Doctoral Research Seminar in Survey Methodology (3-6 Credits)
An advanced research seminar for students preparing to do research or take doctoral comprehensive examinations.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

SURV898 Pre-Candidacy Research (1-8 Credits)

SURV899 Doctoral Dissertation Research (1-8 Credits)

TDPS - Theatre, Dance and Performance Studies

TDPS440 Arts Leadership Seminar (3 Credits)
An advanced seminar in arts leadership exposing students to the foundations of arts leadership in not-for-profit organizations as it intersects with current trends in technology, demographics, government policy, and the economy. In case studies based on examples drawn from local arts organizations, students will learn about audience engagement as well as institutional development terminology and best practices.Cross-listed with: ARHU440.
Credit Only Granted for: TDPS4440 or ARHU440.

TDPS458 Special Topics in Advanced Performing Arts (1-3 Credits)
Designed for performing arts students. Offers instruction at an advanced level in various aspects of performance such as Voice for the Performing Arts, Movement for the Performing Arts, Acting for the Performing Arts, Partner Dance and a myriad of specific aspects within these genres.
Prerequisite: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 9 credits if content differs.

TDPS469 Advanced Practicum in Stage Management (1-3 Credits)
A graded course in stage management for theatre and/or dance productions. A hands-on laboratory experience.
Prerequisite: Minimum of 2 credits from TDPS479.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

TDPS470 Production Management (3 Credits)
To familiarize students with techniques and skills required of a Production Manager in a theatrical production. Focus will also be given to the field of event management.
Prerequisite: TDPS201, THET222, THET223, and THET116; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Credit Only Granted for: TDPS458D or TDPS470.
Formerly: TDPS458D.

TDPS479 Production Practicum (1-3 Credits)
A graded course in a specified practical aspect of mounting a theatre or dance production. It is a hands-on, purely laboratory experience.
Prerequisite: TDPS201.
Repeatable to: 10 credits if content differs.
Credit Only Granted for: TDPS479 or THET479.
Formerly: THET479.

TDPS789 Professional Development in Dance and Theatre (1 Credit)
This course will introduce graduate students to the academic job market, competitive fellowships, and ALT-AC (alternative academic) careers. Topics will include the interdisciplinary job market, cover letters, cv's, teaching and research statements, the teaching/artist portfolio, the diversity statement, interfolio, letters of recommendation, writing samples, websites, interviewing, and careers beyond academia.
Repeatable to: 4 credits.
Formerly: THET669K, DANC689F.

THET - Theatre

THET408 Seminar: Theory and Performance Studies (3 Credits)
Studies in theatre theory and performance studies from classical antiquity to the present.
Repeatable to: 12 credits if content differs.

THET411 Voice for the Actor II (3 Credits)
Learn the International Phonetic Alphabet (IPA) and apply to exploration of sound and language. Designed to increase voice and speech awareness, and create a base knowledge from which to approach any accent or dialect.
Prerequisite: THET324 or THET325; and must audition; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Restriction: Junior standing or higher.
Credit Only Granted for: THET311, THET411, or THET499L.
Formerly: THET311.

THET420 Language and the Actor (3 Credits)
Explores the actor's relationship to language, particularly heightened poetic language, in order to: develop the ability to embody language and vocally and physically project the images; apply an intellectual understanding of the inherent structural, poetic, and rhetorical techniques of heightened language in combination with action theory; and access the inner states of character while expressing them through text.
Prerequisite: THET325 or THET324; and must audition; and permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET424 Movement II: Advanced Studies in Movement and Mask Theatre (3 Credits)
A deeper exploration of how to use the actor's instrument for dramatic expression. Continuing work in the F.M. Alexander Technique and foundational exercise to help actors learn what they need to prepare for rehearsal and performance. Other techniques may include theatrical styles, physical character, dramatic use and play with space and rhythm and masks.
Prerequisite: THET325 or THET324; and must audition; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Restriction: Junior standing or higher.

THET425 Actor's Process II (3 Credits)
A deeper exploration of the work begun in THET325. A continuation of creating a personal process through which the actor can confidently approach any genre of play. Special focus on status and subtext and the world of the playwright.
Prerequisite: THET325; and must audition; and permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET426 Theatrical Clown (3 Credits)
Progression of developing individual clown characters through methods based on European pedagogy which emphasizes a physical and technical approach to actor training.
Prerequisite: THET324 or THET325; and must Audition.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Credit Only Granted for: THET426, THET499C or THET 499O.
Formerly: THET499C, THET499O or THET426.

THET428 Special Topics in Advanced Theatre and Performance (1-3 Credits)
This course is offered as part of the School of Theatre, Dance, and Performance Studies' Artist in Residence program. Topics covered may include: Intercultural Theatre; Performance Art; Puppetry; Solo Performance; or Theatrical Design.
Prerequisite: THET114 or TDPS201; and (THET116, THET222, and THET223); and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Restriction: Junior standing or higher.
Repeatable to: 3 credits if content differs.
Additional Information: Incorporate the change from THET 114 to TDPS 201, listing both numbers, as students will take the prerequisite under either number. To change the catalog description to reflect the proper unit name as the School of Theatre, Dance, and Performance Studies.

THET429 Actor's Studio (1-3 Credits)
Participation in dramatic roles executed under faculty supervision in the department's productions. Eligible students must make commitments and plan performances with course instructor during pre-registration.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 10 credits.

THET430 Directing II: Working with Actors (3 Credits)
Discussion of the preparation procedures and rehearsal practices necessary for the presentation of a variety of theatrical styles and forms. Emphasis on understanding the relationship between the director, the actor, the script and the audience. A series of student directed scenes supplemented by attendance at theatre productions.
Prerequisite: THET330; and (THET324 or THET325); and must Audition; and permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET435 Advanced Costume Construction (3 Credits)
The course is taught in a presentation/practical application format. Students will learn advanced techniques in draping and pattern development and develop proficiency in communication of design and construction choices.
Prerequisite: THET284 and THET384; and portfolio review; and permission of ARHU-School of Theatre, Dance & Performance Studies department. Jointly offered with THET635.
Credit Only Granted for: THET435, THET499 K, THET635, or THET669K.
Formerly: THET499K and THET669K.

THET440 Advanced Playwriting (3 Credits)
Ensemble-based writer's workshop. It is the second part of a two-course sequence and is designed for students who already have a foundation in the basics of playwriting or who are other wise well-versed in the art of theatre and dramatic structure. Through exploratory writing sequences, the reading of full-length plays, and in-class readings of work-in-progress, students will continue to deepen their craft and develop the script for a new full-length play.
Prerequisite: THET340; or permission of instructor. And permission of ARHU-School of Theatre, Dance & Performance Studies department.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Credit Only Granted for: THET440 or THET499P.
Formerly: THET499P.

THET451 Musical Theatre Workshop I (3 Credits)
Development of the ability to move, act and express through the media of lyric and music.
Prerequisite: Must audition.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET452 Musical Theatre Workshop II (3 Credits)
Development of the ability to move, act and express through the media of lyric and music from the integrated musicals of the 1960s through the development of concert and rock/pop musicals.
Prerequisite: Must audition.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET465 History of Fashion for the Theatre (3 Credits)
A survey of Western clothing from the Ancient Worlds through 20th Century. A discussion of the cultural contexts of various trends in fashion through an examination of art, industry and textiles.
Prerequisite: THET116; or permission of instructor.
Restriction: Sophomore standing or higher.

THET469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.

THET471 Design Studio in Scenery (3 Credits)
Advanced study of scenic design for the theatre. Particular design projects will vary.
Prerequisite: THET371; and permission of ARHU-School of Theatre, Dance & Performance Studies department. Jointly offered with THET639.
Credit Only Granted for: THET471 or THET639.

THET472 Scene Painting (3 Credits)
Scene painting techniques and materials. Three-dimensional realistic scenery and non-realistic two-dimensional projects.
Prerequisite: THET114 or TDPS201; or permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET473 Rendering for the Theatre II (3 Credits)
Continued study in rendering techniques and graphic skills for theatrical design presentation. Emphasis on style, technique and use of different artistic media.
Prerequisite: THET373; or permission of instructor.

THET474 Advanced Stage Management (3 Credits)
Intensive practical study of the techniques and procedures for stage management.
Prerequisite: THET114 or TDPS201; and (THET116, THET222, THET223, and THET274); and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department; and sophomore standing or higher.

THET475 History of Art, Architecture, and Decor for the Theatre (3 Credits)
Study of Western art, architecture, and decor and their practical application to theatrical production.
Prerequisite: THET114 or TDPS201; and (THET116, THET222, and THET223); and permission of ARHU-School of Theatre, Dance & Performance Studies department. Jointly offered with THET670.
Credit Only Granted for: THET475 or THET670.

THET477 Design Studio in Lighting (3 Credits)
Designed for students who have successfully completed THET377 and wish to further develop their lighting design skills. Emphasis is on theoretical design of productions and realized light lab projects. Particular design projects will vary.
Prerequisite: THET377; and permission of ARHU-School of Theatre, Dance & Performance Studies department. Jointly offered with THET659.
Credit Only Granted for: THET477 or THET659.

THET479 Production Practicum (1-3 Credits)
Designed to expand students' practical knowledge and skills through working on Department of Theatre productions.
Prerequisite: THET116 and THET114; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits if content differs.

THET481 Theatre Graphics II: Computer Assisted Design (3 Credits)
Study and practical application of computer generated graphical design for use in theatrical production.
Prerequisite: THET114 or TDPS201; and THET116; and permission of ARHU-Theatre department.
Restriction: Sophomore standing or higher.

THET482 Scene Painting II (3 Credits)
Advanced study of theatrical scenic painting.
Prerequisite: THET472; or permission of instructor.
Restriction: Sophomore standing or higher.

THET486 History of Modern Theory & Performance (3 Credits)
Modern dramatic and performance theory from realism to the absurd with special emphasis on the European and American avant-garde.
Prerequisite: THET488 or THET489; or permission of instructor. Also offered as: THET686.
Credit Only Granted for: THET486 or THET686.

THET488 Special Topics in Theatre History Before 1800 (3 Credits)
Topics in the history of world theatre and performance from the Greeks through 1800.
Repeatable to: 12 credits if content differs.

THET489 Special Topics in Theatre History from 1800 to Present (3 Credits)
Topics in the history of world theatre and performance from 1800 to present.
Repeatable to: 12 credits if content differs.

THET491 Theatrical Rendering Using Photoshop (3 Credits)
A studio course in rendering for the theatre. The course focuses primarily on traditional approaches to perspective drawing, space, texture, color and lighting rendering using Photoshop. Photoshop tools and techniques; preparing three-dimensional objects for accurate rendering; and techniques for Photoshop rendering and lighting of three-dimensional objects and architectural forms. This class primarily has an emphasis on rendering/uses for scenic design.
Prerequisite: THET471.
Credit Only Granted for: THET491 or THET428O.
Formerly: THET428O.

THET497 Non-Traditional Theatre (3 Credits)
Seminar exploring American and European experimental performance since 1960. Topics include experimental theatre, performance art, pornography and performance, gender and performance, and popular culture and performance. Topics are treated historically and theoretically. Student-produced performance projects are an important component of the seminar.

THET498 Seminar: Theatre History (3 Credits)
Studies in theatre history from classical antiquity to the present.
Prerequisite: THET488 or THET489.
Restriction: Senior standing; and permission of instructor.
Repeatable to: 6 credits if content differs. Jointly offered with THET698.
Credit Only Granted for: THET498 or THET6 98.

THET499 Independent Study (1-3 Credits)
An independent study course in which each student completes an assigned major theatre project under close faculty supervision. Projects may culminate with term papers, scenic or costume designs, or a stage production.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

THET600 Introduction to Graduate Research Methods (3 Credits)
Basic skills in theatre research.
Restriction: Must be a graduate student in a Theatre program. Also offered as: THET700.
Credit Only Granted for: THET600 or THET700.
Additional Information: Only students in the doctoral program may register for THET700.

THET606 Teaching Theatre (1 Credit)
Strategies and materials for teaching a typical introductory course in theatre, with emphasis on specific problems of classroom instruction (e.g., creating a supportive climate, promoting active learning by students, constructing appropriate tests, adapting methods to content, and resolving discipline problems).

THET608 Seminar: Theory and Performance Studies (3 Credits)
A repeatable seminar on special topics in theory of the Theatre and Performance Studies.
Recommended: THET700 and THET600.
Repeatable to: 9 credits if content differs. Jointly offered with THET408.
Credit Only Granted for: THET40 8 or THET608.

THET614 Ethnography and Performance (3 Credits)
Different types of cultural and artistic preformance around the world (theatre, music, dance, sport, festival) are examined. Students learn 1) how various types of live performance are studied ethnographically; 2) what thick description reveals and how it adds to the analysis of performance; and 3) methods for conducting an ethnographic study of performance.
Credit Only Granted for: ANTH688O, THET608E, or THET614.
Formerly: THET608E.

THET616 Character Development (2-3 Credits)
European-based pedagogy which emphasizes a physical and technical approach to actor training. Includes technique training in physical theatre and movement, voice, monologue writing, site-specific performance, and street theatre.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET619 Special Topics in Performance Studio (2-6 Credits)
This is a rotating "special topics" course that will address the history and theory of performance in areas including: political performance, experimental theatre, and contemporary theatre. The course will be offered by guest artists/instructors who are part of the Theatre Department's professional network of scholars and artists.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET627 Verse Analysis (2 Credits)
Exploration of how verse works. Looking at objective issues of verse speaking iambic pentameter and its variations, heightened versus naturalistic speech, antithesis, onomatopoeia, assonance, alliteration, and the difference between verse and prose as well as irony, ambiguity, passion, coolness, exploring character, poetry and hidden poetry.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET629 Performance Lab (1 Credit)
Students will develop a performance project based on the training that they have received in their current semester's study. This course offers students the oportunity to expand and develop their practice.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET630 Voice I (2 Credits)
Students will learn the Linklater progression of voice exercises. Work will include the discovery of sound in the body, awareness and opening of the channel, exploration of resonance, vocal freedom and range, isolating and strengthening resonating chambers and articulation exercises.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET632 Playwriting (3 Credits)
Lessons in playwriting, including character, plot, dramatic structure, dialogue, exposition, setting, and creating theatrical images.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET635 Advanced Costume Construction (3 Credits)
The course is taught in a presentation/practical application format. Students will learn advanced techniques in draping and pattern development and develop proficiency in communication of design and construction choices.
Prerequisite: THET284 and THET384; and portfolio review; and permission of ARHU-School of Theatre, Dance & Performance Studies department. Jointly offered with THET435.
Credit Only Granted for: THET435, THET499 K, THET635 or THET669K.
Formerly: THET499K and THET669K.

THET637 Movement Awareness (2 Credits)
Based on the F.M. Alexander Technique, students will learn to recognize habit patterns that interfere with movement, breath, voice, and expression.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET639 Advanced Design Studio in Scenery (3 Credits)
A repeatable course that allows students to progress in their design training through a series of carefully and individually structured assignments and projects.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 12 credits if content differs. Also offered as: THET471.
Credit Only Granted for: THET471 or THET639.

THET640 Voice II (2 Credits)
Build on an understanding of vocal anatomy and knowledge of habitual vocal usage, this course will challenge students to work beyond their habitual voice patterns. Emphasis will be placed on range, resonance, and vocal improvisation.
Prerequisite: THET630.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET642 Thesis Development (2 Credits)
Focus on writing the scripts for the thesis projects that will be performed in year three in the Festival of New Works. The course is designed to compose and finish a story in the form of a play or devised script during the course of the semester. Students will hone skills of listening and critique, and to provide a forum in which you can share and garner feedback on your work.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET643 Puppetry and Performance (3 Credits)
Students will learn the history and techniques of puppetry (Western and Non-Western).
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET647 Movement Fundamentals (2 Credits)
Based on Jacques Lecoq's technique of neutral mask and character mask.
Prerequisite: THET637.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET648 Performance Practicum (3 Credits)
A "hands-on" course providing students with opportunities to apply techniques, concepts, and principles learned in class to practical production projects in real time situations. Generally, practicum students will participate in a Main-stage production.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 6 credits.

THET649 Advanced Design Studio in Costume (3 Credits)
A series of carefully and individually structured assignments and projects that allows students to progress in their design training.
Repeatable to: 12 credits if content differs.
Credit Only Granted for: THET483 or THET649.

THET650 Voice III (2 Credits)
Deepening understanding and experience of the unique voice. Work will focus on identifying vocal habits, and then learning new tools such as the International Phonetic Alphabet, phrasing distinctions, and Roy Hart vocal techniques.
Prerequisite: THET640.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET652 Ensemble Devised Performance (3 Credits)
Process of developing an ensemble, and as an ensemble researching, developing and performing a devised performance. The techniques involve teaching how each solo voice must be developed in order for the ensemble voice to function efficiently.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET657 Movement Styles (2 Credits)
Based on the techniques of theatrical clown originally developed by Jacques Lecoq and further developed by Serge Martin, Phillipe Gaulier and Pierre Byland. Builds from the techniques learned with neutral and character mask work. Theatrical clown work increases a performer's flexibility, ability to pick up cues, enhances stage presence, and teaches the performer to work beyond the fourth wall.
Prerequisite: THET637.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET659 Advanced Design Studio in Lighting (3 Credits)
A repeatable course that allows students to progress in their design training through a series of carefully and individually structured assignments and projects.
Restriction: Must not have completed THET477; and permission of ARHU-School of Theatre, Dance & Performance Studies department.
Repeatable to: 12 credits if content differs. Jointly offered with THET4 77.
Credit Only Granted for: THET477 or THET659.

THET669 Independent Study (1-3 Credits)

THET670 Period Style for the Theatre: Fashion and Decor (3 Credits)
A study of environmental decor, theatrical architecture, historic ornament and fashion through the ages and their practical application for theatrical production.
Recommended: THET600. Jointly offered with THET475. Credit only grante d for: THET475 or THET670.

THET672 Theory of Visual Design in Scenery (3 Credits)
A historical and theoretical study of design practices in performing arts with an emphasis in scene design and interpretation.

THET677 Production Practices (2 Credits)
Explores business practices in the field of professional theatre, including arts management, development, and marketing.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET678 Theory of Visual Design For the Performing Arts (3 Credits)
A historical and theoretical study of design practices in the performing arts.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET685 History of Theatrical Theory Before Modernism (3 Credits)
Theories of drama (written script) and theatre (performance) from fifth-century B.C. Greece through nineteenth-century romanticism.
Recommended: THET600.

THET686 History of Modern Theory (3 Credits)
Modern dramatic and performance theory from realism through postmodernism with special emphasis on the European and American avant-garde.
Recommended: THET600. Jointly offered with THET486.
Formerly: THET689.

THET688 Special Problems in Drama (3 Credits)
The preparation of adaptations and other projects in dramaturgy.

THET697 Performance Thesis Project (3 Credits)
The thesis project incorporates both a performance and an oral examination that assesses the student's ability to apply techniques and methods learned thoughout his/her course of study. Students will select a performance project based on their areas of expertise or interest. Performances will be videotaped and reviewed by the student's thesis committee.
Restriction: Permission of ARHU-School of Theatre, Dance & Performance Studies department.

THET698 Seminar: Theatre History (3 Credits)
Studies in theatre history from classical antiquity to the present.
Prerequisite: THET391 and THET390; or students who have taken courses with comparable content may contact the department.
Recommended: THET600.
Repeatable to: 9 credits if content differs. Jointly offered w ith THET498.

THET700 Introduction to Graduate Research Methods (3 Credits)
Basic skills in theatre research.
Restriction: Must be a graduate student in a Theatre program. Also offered as: THET600.
Credit Only Granted for: THET600 or THET700.
Additional Information: Only students in the doctoral program may register for THET700.

THET711 Critical Theory (3 Credits)
A doctoral methods course. Major developments in modern and postmodern critical theory with particular emphasis on application to the fields of Theatre and Performance Studies.
Prerequisite: THET700.
Recommended: THET712.

THET712 Historical Research Methods and Historiography in Theatre (3 Credits)
A survey of methods commonly used in writing theatre history and their application to a suitable problem. Formulation of significant research questions, systematic collection of bibliographic and phenomenal information, formulating substantial claims, organizing and writing research for disciplinary outlets.
Prerequisite: THET700.
Formerly: PCOM712.

THET713 Performance Studies (3 Credits)
Introduces doctoral students to theoretical and methodological issues in performance studies. We will focus on 3 primary areas of research, analyzing representational strategies of adaptations, ethnography, and cultural analysis of theatrical performance.
Prerequisite: THET700.

THET788 Master's Tutorial (1-6 Credits)
Collaboration with a faculty member on joint creative and artistic projects.
Restriction: Permission of instructor.

THET789 Master's Practicum (1-6 Credits)
Participation in creative and artistic activities with professional level theatrical organizations.
Restriction: Permission of instructor.

THET799 Master's Thesis Research (1-6 Credits)

THET888 Doctoral Practicum in Theatre (1-6 Credits)
Critical analysis of a phase of a professional field of theatre. Analysis of professional activity through personal observation. Evaluation of the purpose, process, effectiveness, and efficiency of professional activity. Recommendations for training and further research.
Repeatable to: 6 credits.

THET889 Doctoral Tutorial in Theatre (1-6 Credits)
Individual research in theatre.
Repeatable to: 6 credits.

THET898 Pre-Candidacy Research (1-6 Credits)
Repeatable to: 12 credits.

THET899 Doctoral Dissertation Research (1-10 Credits)
Formerly: PCOM899.

TLPL - Teaching and Learning, Policy and Leadership

TLPL401 Student-Centered Curriculum and Instruction (3 Credits)
A focus on using student-centered teaching and learning approaches in high school STEM classrooms. Students will develop and implement a multi-day series of lessons, building upon the foundations of inquiry-based practices developed in prior courses. Students will also consider the implications of cultural awareness on teaching practices broadly, as well as in the specific contexts of their fieldwork.
Prerequisite: Permission of instructor; and TLPL102; and must have completed or be concurrently enrolled in TLPL488M.
Credit Only Granted for: TLPL488P or TLPL401.
Formerly: TLPL488P.
Additional Information: Field experience for this course will require students to be available for a 2-4 hour block of time at various points throughout the semester to complete observations and teach lessons between 8:00 a.m. and 3:30 p.m. A background check is required and will be facilitated through the Terrapin Teacher program coordinator.

TLPL403 Teaching and Learning High School Mathematics (3 Credits)
Methods of teaching and assessing the high school mathematics curriculum; aligning tasks and activities to curriculum standards; lesson planning; and selection and use of technology. The course also focuses on managing large group dynamics in the high school mathematics classroom.
Prerequisite: Must have 2 semesters of calculus; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Corequisite: EDCI355.
Restriction: Must be in Secondary Educ: Mathematics program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI455 or TLPL403.
Formerly: EDCI455.

TLPL406 Teaching and Learning Mathematics in the Elementary School, Part 1 (3 Credits)
Focuses on teaching and learning whole numbers. Special emphasis will be placed on developing equitable teaching practices that enable culturally and linguistically diverse students to develop knowledge and skills that promote mathematical proficiency. Mathematical concepts: Content knowledge: some aspects of early numeracy, whole numbers and the four arithmetic operations, some aspects of algebraic thinking.Jointly offered with: TLPL607.
Credit Only Granted for: TLPL607 or TLPL406.

TLPL407 Teaching and Learning Mathematics in the Elementary School, Part 2 (3 Credits)
Focuses on teaching and learning rational numbers (fractions and decimals) and developing algebraic thinking. Special emphasis will be placed on developing equitable teaching practices that enable culturally and linguistically diverse students to develop knowledge and skills that promote mathematical proficiency. Mathematical concepts: Content knowledge: rational numbers (fractions and decimals) and the four arithmetic operations, algebraic thinking, some aspects of geometry and measurement.
Credit Only Granted for: TLPL488G or TLPL407.

TLPL413 Teaching and Learning Middle School Mathematics (3 Credits)
Methods of teaching and assessing the middle school mathematics curriculum. Understanding the conceptual difficulties students have in moving from whole numbers to rational numbers, additive thinking to multiplicative thinking, and arithmetic to algebra. Lesson planning and selection of technology and other materials are applied in the context of supervised tutoring of students having difficulty in middle school mathematics. Lab and field experience required. Supervised tutoring takes place on site at a local middle school therefore TLPL413 students will be expected to travel to a local middle school for 8-10 of the class meetings.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI457 or TLPL413.
Formerly: EDCI457.

TLPL414 Knowing and Learning in Mathematics and Science (3 Credits)
Special and intensive treatment of current topics and issues in mathematics and science teaching and learning, policy and leadership. The overall goal of the course is to orient future teachers to the discourses and theories that shape what we know about how students learn math and science.
Prerequisite: Must have completed or be concurrently enrolled in TLPL102.
Credit Only Granted for: TLPL488M or TLPL414.
Formerly: TLPL488M.

TLPL415 Perspectives in Science (3 Credits)
Overview of the history of science and philosophical perspectives on science, particularly as they apply to science teaching.
Prerequisite: Permission of instructor.
Credit Only Granted for: TLPL488W or TLPL415.
Formerly: TLPL488W.

TLPL418 Teaching Residency (3-9 Credits)
An extended teaching internship in an Elementary Professional Development School. School placements to be arranged.
Prerequisite: Must have completed or be concurrently enrolled in TLPL352, TLPL363, TLPL372, TLPL415.
Restriction: Restricted to Elementary Education majors with permission of the Department. 2.75 GPA required.
Repeatable to: 12 credits.
Credit Only Granted for: TLPL418 or EDCI481.

TLPL420 Knowledge, Reasoning, and Learning in Science (3 Credits)
For prospective science teachers. Investigations of the nature of knowledge, reasoning, and learning in middle and secondary science. Readings from cognitive science and science education research; studies of student thinking in interview and classroom observations; analyses of curricula. Includes laboratory and field experiences.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: TLPL420 or EDCI411.
Formerly: EDCI411.

TLPL421 Practices in Secondary School Science Teaching (2 Credits)
Analyses of student thinking, instructional interpretations, strategies, and techniques in the teaching internship.
Prerequisite: TLPL425.
Corequisite: EDCI471 and EDCI474.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department; and must be in Secondary Educ: Science program. Or minimum cumulative GPA of 2.75.
Credit Only Granted for: TLPL421 or EDCI480.
Formerly: EDCI480.

TLPL423 Interdisciplinary Teaching in the Middle Grades I (2 Credits)
For prospective middle school teachers. Studying and planning interdisciplinary instructional practices in middle school. Utilizes context and experiences from students' field placements. Use of technology and incorporation of technology into instruction.
Prerequisite: TLPL413 and TLPL420; or permission of instructor.
Corequisite: EDCI360 and TLPL475.
Restriction: Minimum cumulative GPA of 2.75; and must be in the Middle School Teacher Education Program, major code 0804P.
Credit Only Granted for: EDCI413 or TLPL423.
Formerly: EDCI413.

TLPL424 Interdisciplinary Teaching in the Middle Grades II (2 Credits)
For prospective middle school teachers. Planning and implementing interdisciplinary instructional practices in middle school. Draws on the context of and experiences in the student teaching placement. Use of technology and incorporation of technology into instruction.
Prerequisite: EDCI360 and TLPL423.
Corequisite: TLPL476 and EDCI460.
Restriction: Minimum cumulative GPA of 2.5; and must be in the Middle School Teacher Education Program.
Credit Only Granted for: EDCI414 or TLPL424.
Formerly: EDCI414.

TLPL425 Learning and Teaching in Science (3 Credits)
Studies of student learning and instructional practices in science teaching.
Prerequisite: TLPL420; or permission of instructor.
Restriction: Must be in Secondary Educ: Science program.
Credit Only Granted for: EDCI470 or TLPL425.
Formerly: EDCI470.

TLPL430 Field Experience in Art Education (1 Credit)
Practical classroom experience in teaching/evaluating/exhibiting the products of art lessons.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department; and must be in Secondary Educ: Art program.
Credit Only Granted for: EDCI400 or TLPL430.
Formerly: EDCI400.

TLPL431 Student Teaching in Elementary School: Art (4-8 Credits)
Prerequisite: TLPL435.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department; and must be in Secondary Educ: Art program.
Credit Only Granted for: EDCI401 or TLPL431.
Formerly: EDCI401.

TLPL432 Student Teaching in Secondary Schools: Art (2-8 Credits)
Prerequisite: TLPL435.
Restriction: Minimum cumulative GPA of 2.75; and must be in Secondary Educ: Art program; and permission of Teaching and Learning, Policy and Leadership Department.
Credit Only Granted for: EDCI402 or TLPL432.
Formerly: EDCI402.

TLPL433 Foundations of Art Education (3 Credits)
Introduction to the field of Art Education and the role of the visual arts in grades PreK-12 for today's diverse school populations. The fundamental, historical and philosophic components of art education with an emphasis on arts disciplines and curriculum. Includes a school-based practicum. For those considering art education as a major.
Restriction: Minimum cumulative GPA of 2.75.
Credit Only Granted for: EDCI403 or TLPL433.
Formerly: EDCI403.

TLPL434 Student Teaching Seminar: Art Education (3 Credits)
An analysis of teaching theories, strategies, and techniques in the student teaching experience.
Prerequisite: TLPL435 and TLPL430.
Corequisite: TLPL432 and TLPL431.
Restriction: Minimum cumulative GPA of 2.75; and must be in Secondary Educ: Art program.
Credit Only Granted for: EDCI404 or TLPL434.
Formerly: EDCI404.

TLPL435 Art Education Methods I (3 Credits)
Methods I provides future art teachers with a knowledge base of the theories and best practices of effective pedagogy for: teaching methods and strategies, diversity, motivational techniques, classroom management, assessment and evaluation methods, and accommodating all students including those with special needs.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department. And must be in Secondary Educ: Art program; or must be in Secondary Educ: Art pre-major program.
Credit Only Granted for: EDCI405 or TLPL435.
Formerly: EDCI405.

TLPL436 Studio Processes and Materials: 2D (3 Credits)
A discussion/studio format used to develop skills, materials, resources and education strategies for using technology and two-dimensional art in K-12 programs.
Prerequisite: ARTT210.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department; and junior standing or higher; and must not be in any of the following programs (Early Childhood Education; Elementary Education; Secondary Educ: Science; Secondary Educ: English Language Arts; Secondary Educ: Mathematics; Secondary Educ: Foreign Languages; Secondary Educ: Social Studies; Physical Education; Music Education; Special Education).
Credit Only Granted for: EDCI406 or TLPL436.
Formerly: EDCI406.

TLPL437 Studio Processes and Materials: 3D (3 Credits)
A lecture-studio course to develop skills, material resources, and educational strategies for three-dimensional projects in school settings.
Restriction: Must be in Secondary Educ: Art program; or must be a Pre-Art Education Major.
Credit Only Granted for: EDCI407 or EDCI437.
Formerly: EDCI407.

TLPL440 Issues in the Education of English Language Learners (3 Credits)
Introduction to and analysis of current and historical research, practice, trends, and public policy issues in education as they relate to English language learners in K-12 and other settings.
Credit Only Granted for: EDCI432 or TLPL440.
Formerly: EDCI432.

TLPL441 Pedagogy of Teaching English Language Learners (3 Credits)
A survey of the historical and current approaches, methods, and techniques of teaching English to speakers of other languages, from grammar translation and audiolingual to communicative and task-based approaches will be presented. Additionally, successful classroom practices that address the needs of culturally diverse and language minority students will be analyzed. Students will have the opportunity to discuss, probe and apply theories and principles to hands-on teaching practices in real-life settings. Digital technologies that assist teaching English language learners (ELLs) will be emphasized as well.
Credit Only Granted for: EDCI434 or TLPL441.
Formerly: EDCI434.

TLPL442 Foundations of Literacy and Biliteracy Development (3 Credits)
An overview of the research on literacy and biliteracy development for English learners. Specifically, the course explores the theoretical models and processes of teaching reading and writing, current literacy/biliteracy issues, assessment, and strategies for developing literacy and biliteracy skills for English learners.
Credit Only Granted for: EDCI435 or TLPL442.
Formerly: EDCI435.

TLPL443 Understanding Cross-Cultural Communication for Teaching English Language Learners (3 Credits)
Theories of intercultural communication and techniques for applying them in the teaching of English as a second language (ESL) and content classes. Research and evaluation of selected aspects of a culture as basis for creating, selecting and using culturally-responsive teaching materials and methods.
Credit Only Granted for: EDCI436 or TLPL443.
Formerly: EDCI436.

TLPL444 English Grammar Pedagogy for Teachers of English Language Learners (3 Credits)
Methods of teaching English grammar to English language learners. The role of teaching grammar. Effective methods and techniques for incorporating grammar in other communication activities.
Credit Only Granted for: EDCI437 or TLPL444.
Formerly: EDCI437.

TLPL445 Methods I: K-12 World Language Methods and Technology (3 Credits)
The first of two sequential courses required for achieving competence i teaching a foreign language. The sequel to this course is EDCI433 (Methods II) entitled: Advanced K-12 Foreign Language Methods and Technology. EDCI410 requires on-going examination of theories relevant to language acquisition. Students will also investigate the instructional methods that reflect those theories. Lab and field experiences required.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI410, TLPL445, EDCI688K, or TLPL695.
Formerly: EDCI410.

TLPL446 Language Variation and Multilingualism in Elementary Classrooms (3 Credits)
Issues in language variation and multilingualism in elementary classrooms, schools and communities with a focus on classroom practice, assessment, and policy.
Restriction: Must be in Elementary Education program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching and Learning, Policy and Leadership department.

TLPL447 Art Education Methods II (3 Credits)
Methods II builds upon the pedagogical foundation of Methods I and provides future art teachers with the means for developing pre K-12 art lessons and unit plans for a balanced qualitative art program for today's diverse and inclusive schools and classrooms.
Prerequisite: TLPL435; or students who have taken courses with comparable content may contact the department.
Corequisite: TLPL430.
Restriction: Minimum cumulative GPA of 2.75; and must be in Secondary Educ: Art program.
Credit Only Granted for: EDCI423, EDCI603, TLPL447 or TLPL633.
Formerly: EDCI423.

TLPL450 Advanced K-12 World Language Methods and Technology (3 Credits)
Teaches advanced best practices for effective foreign language instruction. Topics include: using authentic assessment and materials, applying national standards, teaching writing and culture, motivating students, providing strategy instruction, infusing technology, preparing for K-12 employment, and creating a professional portfolio.
Prerequisite: TLPL445.
Corequisite: EDCI438.
Restriction: Must be in Secondary Educ: Foreign Languages program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI433, EDCI688A, TLPL450 or TLPL696.
Formerly: EDCI433.

TLPL451 Teaching and Learning in Secondary Education: English (3 Credits)
An introduction for prospective middle and secondary English teachers into the basic issues, concepts, orientations, and processes that shape the teaching of English for diverse students in schools. Candidates explore their own perspectives in relation to local and national trends and develop basic teaching understanding and skills through on-campus seminars, teaching laboratory experiences, and guided field experiences. Students should reserve one full day or two half days per week for field experience.
Credit Only Granted for: EDCI416 or TLPL451.
Formerly: EDCI416.

TLPL452 Bases for English Language Instruction (3 Credits)
Examines current theory, research, best practice, curricula and materials focused on the teaching of English language to native and non-native English learners. Topics include morphology, syntax, semantics, vocabulary, pragmatics, argument, discourse structure, dialects, edited academic English, English language proficiency (listening, speaking, reading, writing) assessment, and instructional planning. English Language Learner (TESOL and SIOP) and special needs (inclusion) pupil issues considered.
Restriction: Must be in Secondary Educ: English Language Arts program; and minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI417 or TLPL452.
Formerly: EDCI417.

TLPL453 Life in Two Languages: Understanding Bilingual Communities and Individuals (3 Credits)
Overview of society and individual multilingualism. Topics include diglossia, language shift, codeswitching, bilingual first language acquisition, language attrition, dual language education policy and practice.

TLPL456 Teaching Writing (3 Credits)
Examines current theory, research, best practice, curricula and materials for teaching written communication in grades K-12. Focuses on analytical, argumentative, informative/explanatory, literary analysis, narrative, descriptive, and research writing. Emphasizes instructional planning, assessment, writer problem-solving strategies, information search, development, organization and style appropriate to task, purpose and audience for both non-digital and digital text. English Language Learner and special needs pupil issues considered.
Corequisite: EDCI447.
Restriction: Must be in Secondary Educ: English Language Arts program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI467 or TLPL456.
Formerly: EDCI467.

TLPL457 Literature for Adolescents (3 Credits)
Reading and analysis of fiction and nonfiction; methods for critically assessing quality and appeal; current theory and methods of instruction; research on response to literature; curriculum design and selection of books.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI466 or TLPL457.
Formerly: EDCI466.

TLPL460 Materials and Instruction for Creating Skilled and Motivated Readers, Part I (3 Credits)
Selecting, evaluating, and using a variety of materials and instructional strategies to create skilled and motivated readers in the elementary grades; Topics include emergent literacy, vocabulary development, reading comprehension and oral reading fluency in diverse classroom settings.
Restriction: Must be in Elementary Education program; and junior standing or higher. Or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI461 or TLPL460.
Formerly: EDCI461.

TLPL461 Materials and Instruction for Creating Skilled and Motivated Readers, Part II (3 Credits)
Selecting, evaluating, and using a variety of materials to create skilled and motivated readers in the elementary grades, particularly in diverse classroom settings; Topics include word analysis, spelling, writing, reading comprehension strategies, directed reading lessons, and explicit instruction.
Prerequisite: TLPL361 and TLPL460.
Corequisite: TLPL312, EDCI342, TLPL321, and TLPL362.
Restriction: Minimum cumulative GPA of 2.75; and permission of EDUC-Teaching and Learning, Policy and Leadership department; and must be in Elementary Education program.
Credit Only Granted for: EDCI462 or TLPL461.
Formerly: EDCI462.

TLPL462 Reading in the Secondary School (3 Credits)
Provides secondary school teachers with understanding the need for and approaches to teaching students to read and learn from content area texts.
Restriction: Minimum cumulative GPA of 2.75; and must be in one of the following programs (Middle School Education; Secondary Educ: Science; Secondary Educ: English Language Arts; Secondary Educ: Mathematics; Secondary Educ: Foreign Languages; Secondary Educ: Social Studies; Secondary Educ: Art) ; and permission of department required for post-baccalaureate students.
Credit Only Granted for: EDCI463 or TLPL462.
Formerly: EDCI463.

TLPL470 Knowledge, Reasoning, and Learning in Secondary Social Studies (3 Credits)
An exploration of the nature of knowledge and reasoning in social studies disciplines as well as how students learn social studies. Assessment and investigation of students' conceptions and misconceptions as well as their disciplinary thinking. Implications for teaching and initial lesson design are explored through on-campus seminars as well as guided field experiences. Students should reserve a regular half-day per week for the field experience in local schools. This course is required for admission to the secondary social studies double major.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department; and minimum cumulative GPA of 2.75.
Credit Only Granted for: EDCI426 or TLPL470.
Formerly: EDCI426.

TLPL471 Curriculum, Teaching, and Assessment in Secondary Social Studies (3 Credits)
An exploration of curriculum development, teaching, and assessment in secondary history/social studies. Focus on identifying students' conceptions of social studies topics and designing lessons that advance students' disciplinary thinking and understanding.
Prerequisite: TLPL470.
Corequisite: EDCI428.
Restriction: Must be in Secondary Educ: Social Studies program; and minimum cumulative GPA of 2.75. Or permission of EDUC-Center for Learning & Educational Technology.
Credit Only Granted for: EDCI427 or TLPL471.
Formerly: EDCI427.

TLPL475 Equitable Classrooms (2 Credits)
An exploration and application of major theoretical frameworks surrounding equity and critical pedagogy. Creating habits of mind that help teachers see all students as capable of achieving at high levels. Draws on the concurrent field experience.
Prerequisite: TLPL252, TLPL413, and TLPL420.
Corequisite: EDCI360 and TLPL423.
Restriction: Minimum cumulative GPA of 2.75; and must be in Middle School Education program.
Credit Only Granted for: EDCI424 or TLPL475.
Formerly: EDCI424.

TLPL476 Equity and Pedagogy (2 Credits)
An exploration and application of major theoretical frameworks surrounding equity and critical pedagogy. Pedagogical decision making that leads to greater equity and improved student learning for all students. Draws on the concurrent student teaching experience.
Prerequisite: TLPL475.
Corequisite: TLPL424 and EDCI460.
Restriction: Minimum cumulative GPA of 2.75; and must be in one of the following programs (Middle School Education; Early Childhood Education; Elementary Education; Secondary Educ: Science; Secondary Educ: English Language Arts; Secondary Educ: Mathematics; Secondary Educ: Foreign Languages; Secondary Educ: Social Studies; Physical Education; Music Education; Secondary Educ: Art; Special Education).
Credit Only Granted for: EDCI425 or TLPL476.
Formerly: EDCI425.

TLPL478 Professional Seminar in Education (1-3 Credits)
Seminar on the issues and problems teacher candidates encounter in classrooms. Exploration of the skills and strategies that best address these challenges.
Restriction: Must be in a major within the EDUC-Teaching and Learning, Policy and Leadership department.
Repeatable to: 4 credits.
Formerly: EDCI488.

TLPL479 Field Experiences in Education (1-4 Credits)
Field experiences in approved eduation setting with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students admitted to approved teacher education programs.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Repeatable to: 2 credits.
Formerly: EDCI489.

TLPL481 Embracing Diversity in the Classroom Community (3 Credits)
An exploration of the richness and complexity of student diversity that teacher candidates will encounter in K-12 classrooms. Students will engage in critical reflection around diversity and equity issues.
Restriction: Admission to teacher education program; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: TLPL481 or EDCI475.
Formerly: EDCI475.

TLPL488 Special Topics in Education (1-3 Credits)
Special and intensive treatment of current topics and issues in teaching, learning, policy and leadership.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDPS488 or TLPL488.
Formerly: EDPS488.

TLPL489 Internship in Education (1-12 Credits)
Internship or residency experiences in school settings with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students admitted to approved teacher education programs.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Repeatable to: 12 credits.
Credit Only Granted for: EDPS489 or TLPL489.
Formerly: EDPS489.

TLPL498 Special Problems in Education (1-3 Credits)
Exploration of current problems in teaching, learning, policy and leadership. Available only to students who have definite plans for study of approved problems.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDPS498 or TLPL498.
Formerly: EDPS498.

TLPL499 Workshops, Clinics, and Institutes (1-6 Credits)
The following type of educational enterprise may be scheduled under this course heading: Workshops conducted by the College of Education (or developed cooperatively with other colleges and universities) and not otherwise covered in the present course listing; clinical experiences in pupil-testing centers, reading clinics, speech therapy laboratories, and special education centers; institutes developed around specific topics or problems and intended for designated groups such as school superintendents, principals, and supervisors.
Credit Only Granted for: EDPS499 or TLPL499.
Formerly: EDPS499.

TLPL600 Teaching and Learning with Technology (3 Credits)
Provides a concrete, hands-on introduction to teaching and learning with technology. We will explore digital technology and its impact on learning and institutions. We will consider big ideas of the field as well as specific types of learning technologies and pedagogies for use in K-12 classrooms. We will discuss K-12 teaching methods that address the interdisciplinary nature of technology integration. The course will draw on class discussions, inquiry, instructional technology, and collaborative lab-based activities and prepare you to merge technology with your current teaching practice. Assessment with and of technology will also be explored.
Credit Only Granted for: EDCI687 or TLPL600.
Formerly: EDCI687.

TLPL602 Foundations of Technology in Education (3 Credits)
Provides a big-picture survey of technology in education and lays the groundwork for future coursework on the role of technology in education. This course will tackle both theoretical and practical dimensions of technology in education. After completing this course, students will have an understanding of the potential for the uses of technology for teaching and learning, identify the different roles technology can play and be ready for a hands-on introduction to specific topics/tools/pedagogies related to teaching and learning with technology.

TLPL603 Data-driven Decision Making in Schools and Classrooms (3 Credits)
Equips educators to use the data that surrounds them productively. This includes data students generate that can be used to improve student learning outcomes as well as data generated by the classroom and school that can be used to improve pedagogy and classroom culture. After completing this course, students will be better able to collect, analyze, and make decisions based on the data generated by their students and peers.

TLPL604 Teaching Science and Social Studies through Environmental Study (3 Credits)
Curriculum and instruction for science and social studies within a multicultural and environmental context; analysis of social studies and science curriculum materials; utilization of school and community resources.
Restriction: Must be in a major within the EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI695 or TLPL604.
Formerly: EDCI695.

TLPL605 Social, Cultural & Ethical Dimensions of Teaching and Learning with Technology (3 Credits)
Situates technology in the classroom within a larger social and cultural context. Along with exploring social opportunities afforded by technology, this course will cover important cultural and ethical dimensions of technology, including equity, inclusion, access, and questions of privacy and digital citizenship (for both teachers and students). After completing this course, students will be prepared to bring technology into their classrooms in responsible and safe ways while being able to take advantage of the new forms of interaction, instruction, and communication made possible through technology.

TLPL606 Teaching and Learning Mathematics in Secondary Schools (3 Credits)
Objectives, selection and organization of subject matter, appropriate methods, lesson plans, textbooks, technology and other instructional materials; assessment of student learning and other topics pertinent to secondary mathematics education. Internship of other placement in a secondary mathematics classroom is required.
Prerequisite: Enrollment in a University of Maryland program leading to teacher certification; and bachelor's degree in mathematics or related field; and 2 semesters of calculus.
Credit Only Granted for: EDCI651 or TLPL606.
Formerly: EDCI651.

TLPL607 Teaching and Learning Mathematics in the Elementary School (3 Credits)
Strategies and methodologies for the teaching of elementary school mathematics based on current research and theories about how children learn mathematics. Attention is given to professional recommendations and teaching practices that foster communication, reasoning, and reflection in the mathematics classroom. Internship or other placement in an elementary school is required.
Prerequisite: MATH212, MATH213, or MATH214; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDCI652 or TLPL607.
Formerly: EDCI652.

TLPL610 Trends in Mathematics Education (3 Credits)
Recent developments in educational thinking and practice which have affected the curriculum in mathematics.
Credit Only Granted for: EDCI650 or TLPL610.
Formerly: EDCI650.

TLPL611 Teaching and Learning Number in the Middle Grades (3 Credits)
Students develop reflective, theoretical perspectives toward and practical approaches for the teaching and learning of the number system in middle school. There is an emphasis on rational numbers and its pedagogical content knowledge.
Restriction: Admission to M.A or M.Ed. w/ concentration in Mathematics Education; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI683 or TLPL611.
Formerly: EDCI683.

TLPL612 Teaching and Learning Algebra in the Middle School (3 Credits)
Designed to enhance middle school mathematics teachers' content and pedagogical knowledge in algebra.
Prerequisite: Admission to M.A. or M.Ed. with concentration in Mathematics Education; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI655 or TLPL612.
Formerly: EDCI655.

TLPL613 Problem-Solving and Innovative Thinking in the Mathematics Classroom (3 Credits)
Curriculum and instruction for developing thinking skills through the discipline of mathematics. This is a hybrid course designed to blend on-campus class meetings with online experiences.
Prerequisite: Experience teaching mathematics K-12. And TLPL312; or TLPL413; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDCI653 or TLPL613.
Formerly: EDCI653.

TLPL614 Assessing Mathematical Understanding (3 Credits)
Techniques of assessing k-12 students' understanding of mathematics - including standardized tests, but focusing on alternative forms such as individual interviews, writing tasks, performance tasks, portfolios. Mathematics assessment viewed as an ongoing part of instruction.
Prerequisite: TLPL610; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI654 or TLPL614.
Formerly: EDCI654.

TLPL615 Teaching and Learning Geometry in the Middle Grades (3 Credits)
Designed to enhance both the pedagogical and geometric content knowledg of middle school mathematics teachers.
Prerequisite: Admission to M.A. or M.Ed. with concentration in Mathematics Education; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI645 or TLPL615.
Formerly: EDCI645.

TLPL616 Teaching and Learning Statistics in the Middle School (3 Credits)
Designed to enhance both the pedagogical and statistical/data analysis content knowledge of middle school mathematics teachers.
Prerequisite: Admission to M.Ed. or M.A. program in EDCI with concentration in Mathematical Education.
Credit Only Granted for: EDCI656 or TLPL616.
Formerly: EDCI656.

TLPL617 Understanding and Engaging Students' Conceptions of Mathematics (3 Credits)
Research related to K-14 students' common errors in and (mis)understandings of mathematics. Instructional strategies useful in building on errors and changing students' conceptions.
Prerequisite: Experience in teaching math; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI657 or TLPL617.
Formerly: EDCI657.

TLPL618 Digital Learning Tools and Communities (1 Credit)
Addresses the student learning outcomes outlined by the Interstate Teacher Assessment and Support Consortium(InTASC). When this course is successfully completed, students will be able to competently integrate technology into instruction to support student learning and develop research-based strategies for instructional and school improvement. Students are expected to demonstrate proficiency in each of the seven Maryland Teacher Technology Standards as well as the International Society for Technology Educator Standards.
Restriction: Must be in a Master of Education Teacher Certification Program.
Repeatable to: 3 credits.

TLPL620 Trends in School Curriculum: Science (3 Credits)
Recent developments in educational thinking and practice on the curriculum in science education.
Credit Only Granted for: EDCI670 or TLPL620.
Formerly: EDCI670.

TLPL621 Learning and Teaching in the Physical Sciences I (3 Credits)
Engagement in laboratory and inquiry-based methods to develop coherent understandings about the physical world and explore issues in the physical sciences. Personal engagements with phenomena and reflection on the learning and instructional experiences.
Restriction: Enrollment in an EDCI Outreach Program in science education; or must be in Curriculum and Instruction (Master's) program; or permission of instructor.
Credit Only Granted for: EDCI604 or TLPL621.
Formerly: EDCI604.

TLPL622 Learning and Teaching in the Physical Sciences II (3 Credits)
A second course in a sequence using laboratory and inquiry-based method to study physical science learning and teaching. Candidates will move toward more sophisticated understandings of elementary/middle school curriculum topics in the physical sciences. Personal engagement with phenomena and reflection on the learning and instructional experiences.
Prerequisite: TLPL621; or permission of instructor.
Credit Only Granted for: EDCI605 or TLPL622.
Formerly: EDCI605.

TLPL623 Learning and Teaching Biological Sciences (3 Credits)
Engagement in laboratory and inquiry-based methods to develop coherent understandings about the natural world and explore issues learning in biology. Personal engagement with phenomena and reflection on the learning and instructional experiences.
Restriction: Enrollment in an EDCI Outreach Program in science education; or must be in Curriculum and Instruction (Master's) program; or permission of instructor.
Credit Only Granted for: EDCI606 or TLPL623.
Formerly: EDCI606.

TLPL624 Learning and Teaching in the Biological Sciences II (3 Credits)
A second course in a sequence using laboratory and inquiry-based method to study learning and teaching in biology. Candidates will move toward more sophisticated understandings of elementary/middle school curriculum topics in the life sciences. Personal engagement with phenomena and reflection on the learning and instructional experiences.
Prerequisite: TLPL623; or permission of instructor.
Credit Only Granted for: EDCI607 or TLPL624.
Formerly: EDCI607.

TLPL625 Teaching Science in Elementary Schools (3 Credits)
Identification of problems in teaching science. Methods for improving the effectiveness of science education.
Credit Only Granted for: EDCI671 or TLPL625.
Formerly: EDCI671.

TLPL626 Learning to Teach and Learn Science (3 Credits)
Developing practices of instruction in science teaching in the context of understanding student science learning.
Prerequisite: TLPL420; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Restriction: Must be in the Maryland Master's Certification program; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI675 or TLPL626.
Formerly: EDCI675.

TLPL627 Reflection and Practice in Secondary School Science Teaching (3 Credits)
Use of classroom videotape and student work as data for teachers to analyze their students' thinking and discuss instructional interpretation, strategies, and techniques in the specific contexts of their classes.
Prerequisite: TLPL626; or permission of instructor.
Restriction: Must be in the Maryland Master's Certification program.
Credit Only Granted for: EDCI676 or TLPL627.
Formerly: EDCI676.

TLPL630 Trends in Art Education Curriculum (3 Credits)
Recent developments in art education.
Credit Only Granted for: EDCI600 or TLPL630.
Formerly: EDCI600.

TLPL631 Historical Foundations of the Arts in Education (3 Credits)
An investigation into major historical events and underlying beliefs, values and practices that influence contemporary arts education (visual art, drama, dance, music) at all levels of instruction. Selected literature that focuses on cultural contexts, individuals, institutions, events and national and international perspectives is used to investigate changing conceptions and practices of arts education.
Credit Only Granted for: EDCI601 or TLPL631.
Formerly: EDCI601.

TLPL632 Understanding and Teaching Aesthetics (3 Credits)
Critical investigation of art, and curriculum implications.
Credit Only Granted for: EDCI602 or TLPL632.
Formerly: EDCI602.

TLPL633 Integrated Art Methods (3 Credits)
Builds upon the pedagogical foundation of an initial art education methods course and provides future art teachers with the means for developing PreK-12 art lesson/unit plans for a balanced qualitative art program for today's diverse and inclusive schools/classrooms. Integratin g art with other subject areas.
Prerequisite: EDCI680; or TLPL435.
Restriction: Must be in a major within the EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI423, EDCI603, TLPL447 or TLPL633.
Formerly: EDCI603.

TLPL634 Teaching Language Arts in Elementary Schools (3 Credits)
Analysis of current issues, trends, and problems in language-arts instruction.
Credit Only Granted for: EDCI643 or TLPL634.
Formerly: EDCI643.

TLPL635 Coaching and Mentoring Teachers: Literacy Across Content Areas (3 Credits)
Provides knowledge on coaching and mentoring teachers in school distric and school settings based on Standards for Middle and High School Literacy Coaches as well as current theory, research and best practice supporting the efficacy of literacy coaching. Emphasis on understanding reading process/strategy instruction; writing process/ strategy instruction; and gathering and interpreting valid and reliable assessment data for creating district-wide and school-based literacy intervention plans.
Prerequisite: Enrolled in EDCI post-baccalaureate certificate Program in Literacy coaching.
Restriction: Must be in Curriculum and Instruction (Master's) program; and permission of instructor.
Credit Only Granted for: EDCI646 or TLPL635.
Formerly: EDCI646.

TLPL636 Trends in Secondary School Curriculum: English (3 Credits)
Recent developments in educational thinking and practice on the curriculum in English education.
Credit Only Granted for: EDCI640 or TLPL636.
Formerly: EDCI640.

TLPL637 Teaching for Equity in Bilingual/Dual Language Immersion Programs (3 Credits)
Focuses on how educators apply and reflect on teaching, learning and school practices aimed to achieve educational equity in dual language programs, including bilingual, two way, and one-way immersion K-12. This course will include instruction, discussion, and materials in a LOTE (Language other than English) to model bilingual instruction.

TLPL640 Assessing, Diagnosing, and Teaching Writing (3 Credits)
Examines current theory, research, best practice, curricula and materials for teaching written communication in middle and secondary schools in order to survey, review and select formal and informal assessments and diagnostic strategies useful for writing teachers. Focuses on validity and reliability issues. Includes instructional planning and development of instructional materials for implementing appropriate individual, small-group and large-group instruction. English Language Learner (TESOL and SIOP) and special needs (inclusion) pupil issues considered.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI673 or TLPL640.
Formerly: EDCI673.

TLPL641 Reading, Cognition, and Instruction: Reading in the Content Areas I (3 Credits)
Provides middle and secondary education students with an understanding of the interactive nature of the reading process, the use of research-based instructional strategies, the relationship between vocabulary development and student concept development, the design of strategic reading instruction, the methods for assessing content area literacy, and the ability to plan instruction and communicate with students, parents, and allied professionals.
Credit Only Granted for: EDCI625 or TLPL641.
Formerly: EDCI625.

TLPL642 Processes and Acquisition of Reading (3 Credits)
Addresses the ways in which social, cultural, cognitive and motivation factors influence the development of literacy. Focus is on reading acquisition and its underlying processes. Topics include language development in relation to reading development; the biological basis of this development; concepts in emergent literacy; models of reading acquisition and skilled reading; the effects of phonemic awareness and phonics on developing readers; factors in early childhood environments and in beginning literacy instruction that impact language and literacy achievement.
Restriction: For Master's Certification Students only; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI626 or TLPL642.
Formerly: EDCI626.

TLPL643 Assessing Student Learning and Development (3 Credits)
Prepares experienced teachers to assess student knowledge, strategies and skills over time so that they can design instruction that builds on student strengths and addresses student needs. Teachers will study the purposes of assessment including school and student needs. Teachers will study the purposes of assessment including school and teacher accountability, student placement, course grade assignment and instructional design. They also will explore types of formal and informal assessment, curriculum-based and curriculum-free assessment, external and teacher made assessment.
Credit Only Granted for: EDCI612 or TLPL643.
Formerly: EDCI612.

TLPL644 Foundations of Reading (3 Credits)
Broad and comprehensive overview of reading and literacy and factors that may influence effective reading practices such as instruction, classroom environment and individual differences. Focus on different knowledge domains and traditions of inquiry related to reading and reading instruction.
Prerequisite: EDCI362; or TLPL462; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDCI660 or TLPL644.
Formerly: EDCI660.

TLPL645 Content Area Reading (3 Credits)
Research-based strategies for improving reading to learn in the content areas (K-12).
Prerequisite: EDCI362; or TLPL462; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDCI661 or TLPL645.
Formerly: EDCI661.

TLPL646 Linguistics in Education (3 Credits)
Provides teachers and educational researchers with the theoretical and technical knowledge of linguistics necessary to engage effectively in their fields.

TLPL647 Diagnostic Reading Assessment and Instruction (3 Credits)
Survey course in diagnostic reading assessment and instruction for graduate students not majoring in reading.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI662 or TLPL647.
Formerly: EDCI662.

TLPL650 Understanding, Evaluating and Using Research in School Reading Programs (3 Credits)
Focus on understanding, critiquing, and applying reading/literacy research; reviewing research to improve practice; analyzing data at the district, school, classroom, and student levels to improve reading instruction.
Credit Only Granted for: EDCI663 or TLPL650.
Formerly: EDCI663.

TLPL651 Leadership in Schoolwide Reading Program (3 Credits)
Preparation of reading personnel to function as resource persons to classroom teachers, administrators and the school community.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI666 or TLPL651.
Formerly: EDCI666.

TLPL652 Multicultural Materials and Instruction for P-12 Readers (3 Credits)
An exploration of the multicultural materials and instructional strategies that create responsive P-12 classrooms and curricula for diverse readers.
Credit Only Granted for: TLPL652 or EDCI667.
Formerly: EDCI667.

TLPL653 Clinical Assessment in Reading (3 Credits)
Clinical diagnostic techniques and materials for assessing reading strengths and needs.
Prerequisite: TLPL645 and TLPL650; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI664 or TLPL653.
Formerly: EDCI664.

TLPL654 Clinical Instruction in Reading (3 Credits)
Clinical procedures and materials for reading instruction.
Prerequisite: TLPL653; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI665 or TLPL654.
Formerly: EDCI665.

TLPL655 Student Assessment in the Second Language Classroom (3 Credits)
Analysis of standardized and teacher-made FL/ESL tests; emphasis on principles of FL/ESL test construction. Field testing of commercial and teacher-made materials.
Credit Only Granted for: EDCI631 or TLPL655.
Formerly: EDCI631.

TLPL656 Teaching Culturally and Linguistically Diverse Exceptional Learners (3 Credits)
Explores cross-cultural and linguistic diversity as they relate to identification procedures for and education of English learners with exceptional needs beyond the second language acquisition process such as learning disabilities and gifted & talented.
Credit Only Granted for: EDCI632 or TLPL656.
Formerly: EDCI632.

TLPL657 Teaching for Cross Cultural Communication (3 Credits)
Theories of intercultural communication and techniques for applying them in the teaching of English as a second language (ESL) and content classes. Research and evaluation of selected aspects of a culture as basis for creating, selecting and using culturally-responsive teaching materials and methods.
Credit Only Granted for: EDCI633 or TLPL657.
Formerly: EDCI633.

TLPL660 Foundations of Literacy and Biliteracy Development (3 Credits)
An overview of the research on literacy and biliteracy development for English learners. Specifically, the course explores the theoretical models and processes of teaching reading and writing, current literacy/biliteracy issues, assessment, and strategies for developing literacy and biliteracy skills for English learners.
Prerequisite: TLPL665.
Credit Only Granted for: EDCI636 or TLPL660.
Formerly: EDCI636.

TLPL661 Multiliteracies: Theory and Practice (3 Credits)
Explores the theoretical constructs and practical manifestations of multiliteracies in communities and schools by presenting an overview of the research on the constructs of New Literacy Studies, Critical Literacy, Digital Literacy, and Funds of Knowledge, as well as the practical implications of teaching reading and writing to culturally and linguistically diverse learners in content areas (i.e., language arts, math, science, social studies, etc.) in classrooms.
Prerequisite: TLPL665.
Credit Only Granted for: EDCI638, EDCI688J, or TLPL661.
Formerly: EDCI638 and EDCI688J.

TLPL662 Second Language Acquisition (3 Credits)
Major theoretical approaches to second language acquisition. For teaching English to speakers of other languages (TESOL).
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI732 or TLPL662.
Formerly: EDCI732.

TLPL663 Practice and Theory in Teaching Second Language Learners (3 Credits)
Focuses on issues that arise while teaching second language (ESOL or foreign language) learners. Supports implementation of theory into practice and research-based best practices during teaching internship, and completion of teaching portfolio during a second field experience.
Corequisite: EDCI637 or EDCI689; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI613 or TLPL663.
Formerly: EDCI613.

TLPL664 Foundations of Second Language Education: Legal, Social and Historical Trends and Issues (3 Credits)
Knowledge of history, research, current practice and public policy issues in the field of second languague education from kindergarten to post-secondary settings. Required for TESOL certification program.
Credit Only Granted for: EDCI630 or TLPL664.
Formerly: EDCI630.

TLPL665 Methods of Teaching ESOL (3 Credits)
This course presents a survey of the historical and current approaches, methods, and techniques of teaching English to speakers of other languages, from grammar to translation to audiolingual and communicative approaches. Additionally, successful classroom practices that address the needs of culturally diverse and language minority students will be analyzed.
Credit Only Granted for: EDCI634 or TLPL665.
Formerly: EDCI634.

TLPL666 English Grammar for Teachers of English to Speakers of Other Languages (3 Credits)
English grammar and methods of teaching grammar for graduate, prospective and current teachers of English to speakers of other languages. Analysis of the major grammatical structures of American English. Discussion of the role of teaching grammar, and effective classroom methods and techniques for the English as a second/foreign language classroom.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI635 or TLPL666.
Formerly: EDCI635.

TLPL667 The School Curriculum (3 Credits)
A foundations course embracing the curriculum as a whole from early childhood through adolescence, including a review of historical developments, an analysis of conditions affecting curriculum change, an examination of issues in curriculum making, and a consideration of current trends in curriculum design.
Credit Only Granted for: EDPS634 or TLPL667.
Formerly: EDPS634.

TLPL668 Developing a Professional Portfolio (1-3 Credits)
Students will examine issues of performance assessment and develop professional portfolios following the guidelines established by the National Board of Professional Teaching Standards. Drawing on the research data collected throughout their program and relying on inquiry, reflections, and analysis, they will synthesize and present the body of their teaching experience.
Repeatable to: 3 credits.
Credit Only Granted for: EDCI614, EDCI619 or TLPL668.
Formerly: EDCI614.

TLPL670 Economics of Education (3 Credits)
An introduction to the application of economic principles to the study of education policy. The course content revolves around issues of efficiency, equity, and freedom of choice. Specific attention is devoted to school finance litigation and reform, practices for raising and allocating resources, and education productivity issues.
Credit Only Granted for: EDPS615 or TLPL670.
Formerly: EDPS615.

TLPL671 Education Policy Analysis (3 Credits)
Policy making in education from planning to evaluation with emphasis on the identification of policy problems and the resources available to analysts through multi-disciplinary approaches. An introductory experience with education policy analysis.
Credit Only Granted for: EDPS620 or TLPL671.
Formerly: EDPS620.

TLPL673 Federal Education Policy (3 Credits)
Federal involvement in education in the United States from 1780 to the present, emphasizing the effects of legislation, court decisions, agencies, and presidential initiatives on the distribution of education opportunities.
Credit Only Granted for: TLPL673 or EDPS625.
Formerly: EDPS625.

TLPL674 Studying Student Learning in Diverse Settings (3 Credits)
This course deepens teacher understanding of student development and th cultural context for teaching through readings and focused field studies. Participants will also begin developing skills needed for investigations using methods of interpretive inquiry.
Credit Only Granted for: EDCI611 or TLPL674.
Formerly: EDCI611.

TLPL675 Embracing Diversity in Classroom Communities (3 Credits)
The course aims to help students understand race, class, gender, and sexuality as systems of privilege, exclusion, marginalization, and the centrality of embracing diversity in the classroom communities to promote the success of all students.
Credit Only Granted for: EDCI697 or TLPL675.
Formerly: EDCI697.

TLPL676 Teaching as a Profession (3 Credits)
The profession of teaching and the knowledge base that defines teaching. Current and social issues that affect teaching and learning; role of research and experience in learning to teach.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI690 or TLPL676.
Formerly: EDCI690.

TLPL677 Reframing Teacher Professionalism: Achieving Teacher Leadership (3 Credits)
Understanding the profession of teaching, teacher leadership, and the knowledge base that undergirds the teaching profession. Multiple perspectives on teaching in the current debate on school reform and how they are aligned across the political spectrum.
Credit Only Granted for: EDCI682 or TLPL677.
Formerly: EDCI682.

TLPL678 Professional Seminar in Education (1-3 Credits)
Seminar on the issues and problems teacher candidates encounter in classrooms. Exploration of the skills and strategies that best address these challenges.
Prerequisite: Admission to a masters certification program in EDCI.
Corequisite: Participation in an arranged school placement.
Credit Only Granted for: EDCI618 or TLPL678.
Formerly: EDCI618.

TLPL679 Field Experiences in Education (1-3 Credits)
Field experiences in approved educational setting with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students admitted to approved teacher education programs.
Repeatable to: 3 credits if content differs.
Formerly: EDPS689.

TLPL680 Contemporary Social Issues in Education (3 Credits)
Theoretical and practical consideration of vital social issues currently affecting education.
Credit Only Granted for: TLPL680 or EDPS601.
Formerly: EDPS601.

TLPL681 History of Education in the United States (3 Credits)
A study of the origins and development of education in the United States, emphasizing the variety of interpretive and methodological concerns that define the field.
Credit Only Granted for: TLPL681 or EDPS611.
Formerly: EDPS611.

TLPL682 Philosophy of Education (3 Credits)
A study of the great educational philosophers and systems of thought affecting the development of modern education, with particular emphasis on recent scholarship on philosophical problems in education.
Credit Only Granted for: EDPS612 or TLPL682.
Formerly: EDPS612.

TLPL683 Educational Sociology (3 Credits)
The sociological study of education as an evolving set of methods and procedures, and body of knowledge. Focuses on several major theoretical perspectives used by sociologists studying education.
Credit Only Granted for: TLPL683 or EDPS613.
Formerly: EDPS613.

TLPL684 Trends in Secondary School Curriculum: Social Studies (3 Credits)
Recent developments in educational thinking and practice on the curriculum in social studies.
Credit Only Granted for: EDCI620 or TLPL684.
Formerly: EDCI620.

TLPL685 Teaching Social Studies in Elementary Schools (3 Credits)
Examination of current literature and research in the social sciences as they relate to social studies curriculum and instruction.
Credit Only Granted for: EDCI622 or TLPL685.
Formerly: EDCI622.

TLPL686 Secondary Social Studies Pedagogy (3 Credits)
The second course in a three-course teaching methods sequence. Addresses two key questions: (1) How do secondary school students think about and learn history/social studies? (2) How can secondary teachers teach history/social studies in ways that promote student learning?
Prerequisite: TLPL470; or EDCI680.
Credit Only Granted for: EDCI627 or TLPL686.
Formerly: EDCI627.

TLPL687 Politics of Education (3 Credits)
Educational institutions as political entities. Focuses on conceptual perspectives for examining political dynamics in governmental and organizational contexts. Provides opportunities to carry out original case studies of policy making processes at various levels of the education policy system.
Credit Only Granted for: EDPS614 or TLPL687.
Formerly: EDPL614.

TLPL688 Special Topics in Education (1-3 Credits)
Special treatment of current topics and issues in teaching, learning, policy and leadership.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Formerly: EDCI688.

TLPL689 Internship in Education (1-12 Credits)
Internship or residency experiences in school settings with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students admitted to approved teacher education programs.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Repeatable to: 12 credits if content differs.
Credit Only Granted for: EDCI689 or TLPL689.
Formerly: EDCI689.

TLPL690 Introduction to Qualitative Methods in Policy Research (3 Credits)
Introduction to research methods and designs used in studies of education policy, planning, and administration.
Credit Only Granted for: EDPS690 or TLPL690.
Formerly: EDPS690.

TLPL691 Research Methods (3 Credits)
The interpretation and conduct of research relevant to curriculum, teaching and learning.
Credit Only Granted for: EDCI685 or TLPL691.
Formerly: EDCI685.

TLPL692 Statistical Literacy for Education Research (3 Credits)
Students will learn about descriptive (measures of central tendencies and dispersion) and inferential (bivariate and OLS regression) statistics with education applications. Throughout the course, students will learn critical basic statistical concepts, and statistics' language and how to interpret results and communicate research findings, both orally and in written form. Students will also explore various statistical techniques and read research articles to better understand statistical procedures and approaches.
Credit Only Granted for: TLPL788C, EDPS788I or TLPL692.
Formerly: TLPL788C.

TLPL693 Principles of Curriculum Development (3 Credits)
Curriculum planning, improvement, and evaluation in the schools; principles for the selection and organization of the content and learning experiences; ways of working in classroom and school on curriculum improvement.
Credit Only Granted for: EDPS635 or TLPL693.
Formerly: EDPS635.

TLPL694 Embracing Diversity: Critical Foundations of Schooling and Education (3 Credits)
Introduces teacher candidates to critical, sociocultural foundations of U.S. schooling, education, and society. Teacher candidates interrogate what it means to be an anti-racist, social justice-oriented educator in a pluralistic classroom.

TLPL695 Methods I: K-12 World Language Methods and Technology (3 Credits)
TLPL 695 requires on-going examination of theories relevant to language acquisition. Students will also investigate the instructional methods that reflect those theories.
Credit Only Granted for: EDCI410, TLPL445, EDCI688K, or TLPL695.
Formerly: EDCI688K.
Additional Information: Lab and field experiences required.

TLPL696 Advanced K-12 World Language Methods and Technology (3 Credits)
Teaches advanced best practices for effective World Language instruction. Topics include: lesson planning, using authentic assessment and materials, applying national and state standards infusing culture, interdisciplinary content and technology. Classroom management procedures and strategies to create a welcoming and engaging classroom environment. Motivating students and differentiated instruction.
Prerequisite: TLPL695; and TLPL695.
Corequisite: Must be concurrently enrolled in TLPL479J.
Credit Only Granted for: EDCI433, EDCI688A, TLPL450 or TLPL696.
Formerly: EDCI688A.

TLPL697 Embracing Diversity: Supporting Culturally and Linguistically Diverse Learners in the Secondary Classrooms (3 Credits)
Explores language variation across a wide range of social, economic, regional and ethnic groups. It is designed to help teacher candidates increase their awareness of language differences and to enhance their effectiveness when teaching in culturally and linguistically diverse secondary classrooms.
Credit Only Granted for: TLPL688G or TLPL697.
Formerly: TLPL688G.

TLPL698 Conducting Research on Teaching (1-3 Credits)
Analysis and improvement of educational practice. Research methods used in the study of classroom teaching. Design and conduct of an action research project. Open only to students admitted to approved teacher education programs.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Repeatable to: 3 credits if content differs.
Formerly: EDCI698.

TLPL699 Master's Seminar (3 Credits)
Directed study for master's degree students writing seminar papers.
Credit Only Granted for: EDPS679 or TLPL699.
Formerly: EDPS679.

TLPL700 Theory and Research in Computer Education (3 Credits)
Examination of the current research and theory in the instructional uses of computers, instructional tutoring systems, computer programing environments, computer-based laboratories and problem solving environments in educational settings.
Prerequisite: TLPL600, EDMS645, and TLPL691; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI783 or TLPL700.
Formerly: EDCI783.

TLPL701 Computers in Science Education (3 Credits)
Current and projected methods by which computers can augment classroom and laboratory-based science instruction in school and non-school settings.
Prerequisite: Must have completed EDCI487; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDCI677 or TLPL701.
Formerly: EDCI677.

TLPL702 Theories of Learning and Leadership with Technology (3 Credits)
Exploration of the impact technology has on how people learn,and how people use technology effectively to facilitate learning. Discussion of theories of designing technology for effective teaching and learning, and examinations of the challenges of implementing technology in education systems.
Credit Only Granted for: EDCI788Q or TLPL702.
Formerly: EDCI788Q.
Additional Information: Priority will be given to students in the Technology Learning and Leadership specialization.

TLPL703 Research on Technology in Education (3 Credits)
Students explore the research methodologies used by those doing research with and on learning technologies, focusing on cultural, experimental, design and learning analytic approaches. Emphasis will be on asking meaningful research questions related to technology and exploring methodological and analytical approaches for answering them. This course will also explore research methods that examine the efficacy of new technologies, research about technology, design methods.
Credit Only Granted for: EDCI788Q or TLPL703.
Formerly: EDCI788Q.
Additional Information: Priority will be given to students in the Technology Learning and Leadership specialization.

TLPL708 Special Topics in Technology, Learning & Leadership (1-3 Credits)
Read, plan, conduct, and report on research projects and research topics related to Technology, Learning & Leadership. Projects may be faculty/student projects, or group or individual student projects (may or may not be related to a dissertation). Emphasis on framing researchable questions and designing/analyzing research studies. Faculty and peer feedback and interaction are crucial expectations.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: EDCI758, TLPL728 or TLPL708.
Formerly: EDCI758, TLPL728.

TLPL710 Theory and Research on Mathematical and Scientific Thinking and Learning (3 Credits)
Study of mathematical and scientific thinking by students at various levels of schooling considered from the perspective of those classic and contemporary theories of learning that are particularly relevant to the study of mathematics and science. Exploration of what it means to understand mathematics and science.
Prerequisite: Admitted to Doctoral Program in Mathematics Education or Science Education; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI751 or TLPL710.
Formerly: EDCI751.

TLPL711 Foundations of Mathematics Education II: Theory and Research on Mathematics Teaching (3 Credits)
Knowledge of and insights into how mathematics has been and is being taught; theories about how it might be taught. Familiarity with the methods used to do research on teaching and to improve teaching.
Prerequisite: TLPL710; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI752 or TLPL711.
Formerly: EDC752.

TLPL712 Foundations of Mathematics Education III: Curriculum (3 Credits)
The study of curriculum in mathematics and research on curriculum. The relationship of mathematics and school mathematics; the forms, purposes,development, and evaluation of mathematics curricula.
Prerequisite: Admitted to Mathematics Education Doctoral Program; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI753 or TLPL712.
Formerly: EDCI753.

TLPL713 Mathematics and Science Education Policy, Professional Development and Teacher Preparation (3 Credits)
Preservice teacher education, professional development, and policy as agents of reform in mathematics education and in science education.
Prerequisite: Admitted to Doctoral Program in Mathematics Education or Science Education; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI754 or TLPL713.
Formerly: EDCI754.

TLPL720 Foundations of Science Education (3 Credits)
Development of science education pre-kindergarten through college; the influences on current and future practices; and the identification and critical analysis of topics in science education.
Prerequisite: TLPL620 or TLPL625; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI770 or TLPL720.
Formerly: EDCI770.

TLPL728 Research Seminar in Mathematics and Science Education (1 Credit)
Read, plan, conduct, and report on research projects and research topics in mathematics and science education. Projects may be faculty/student projects, or group or individual student projects (may or may not be related to a dissertation). Emphasis on framing researchable questions and designing/analyzing research studies. Faculty and peer feedback and interaction are crucial expectations.
Prerequisite: Admission to Doctoral Program in Mathematics or Science Education; and must have completed or be concurrently enrolled in TLPL710 or TLPL713.
Repeatable to: 9 credits if content differs.
Credit Only Granted for: EDCI758 or TLPL728.
Formerly: EDCI758.

TLPL730 Theory and Research in English Education (3 Credits)
A survey of the research literature; evaluation of research techniques; consideration of relevant instructional curriculum theory; evaluation of modern teaching methods and techniques.
Credit Only Granted for: EDCI740 or TLPL730.
Formerly: EDCI740.

TLPL731 Theory and Research in Written Communication (3 Credits)
Analysis and synthesis of recent theoretical trends in writing research; the reading and critiquing of representative research studies. The study of research methods for conducting disciplined inquiry in written communication.
Recommended: TLPL691.
Credit Only Granted for: EDCI745 or TLPL731.
Formerly: EDCI745.

TLPL732 Writing Across the Curriculum (3 Credits)
Emphasis on providing secondary education majors with an interdisciplinary foundation in current theory, research, and best practice focused on the teaching of writing across the curriculum, e.g.,art, English, foreign languages and TESOL, language arts, mathematics, music, sciences, and social studies. Exceptional student, inclusion, and diversity issues w ill be discussed.
Credit Only Granted for: EDCI764 or TLPL732.
Formerly: EDCI764.

TLPL733 Advanced Clinical Practices in Reading Assessment (3 Credits)
Clinical practicum in assessment focusing on strengths and needs in reading. Case report writing and conferences.
Prerequisite: TLPL654.
Corequisite: TLPL734.
Credit Only Granted for: EDCI761 or TLPL733.
Formerly: EDCI761.

TLPL734 Advanced Clinical Practices in Reading Instruction (3 Credits)
Clinical practicum in instruction focusing on instructional techniques and diagnostic teaching.
Prerequisite: TLPL654.
Corequisite: TLPL733.
Credit Only Granted for: EDCI762 or TLPL734.
Formerly: EDCI762.

TLPL738 Theory and Research in Reading (3 Credits)
Survey of the literature in reading and allied fields, and an examination of current research trends and methodologies.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Repeatable to: 6 credits if content differs.
Formerly: EDCI769.

TLPL740 Language and Education (3 Credits)
Dialect, language varieties in school settings; historical and current perspectives on the role of language in learning; theories of school achievement and consequences for language assessment.
Credit Only Granted for: EDCI730 or TLPL740.
Formerly: EDCI730.

TLPL743 Teaching English Language Learners: Current and Future Research Directions (3 Credits)
Research on the preparation of generalists and specialists teaching English Language Learners. Current research and future research directions.
Prerequisite: TLPL771 or TLPL662; or permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDCI734 or TLPL743.
Formerly: EDCI734.

TLPL744 Research Foundations of Second Language Education: Examining Linguistically Diverse Student Learning (3 Credits)
Critically examine theories of second language acquisition and research in applied linguistics relevant to linguistically diverse students and learners of English as an additional language. Analysis of research from linguistic, psycholinguistic, sociolinguistic and sociocultural perspectives, with an emphasis on the social contexts of second language learning and teaching.
Prerequisite: TLPL664 or TLPL662; and permission of EDUC-Teaching and Learning, Policy and Leadership department. Or permission of instructor.
Credit Only Granted for: EDCI735 or TLPL744.
Formerly: EDCI735.

TLPL745 Classroom Inquiry Toward Teacher Professional Development (2 Credits)
Emphasizes current research and best practice on teacher inquiry as a mode of professional development. Participants will work within a teacher-coaching model to create a professional development presentation on writing and classroom writing instruction.

TLPL760 College Teaching (3 Credits)
Critical review of literature on teaching in higher education from conceptual and practical viewpoints. Designed for current and prospective adult educators. Focused on research and improvement of instruction.
Credit Only Granted for: EDPS757 or TLPL760.
Formerly: EDPS757.

TLPL761 History of Curriculum Theory and Development (3 Credits)
The writings of major educators in curriculum. Conceptual and formal similarities and differences between current curriculum projects and historical antecedents. Survey of curriculum materials for classroom use in their relationship to the curriculum theory of their time.
Prerequisite: TLPL693.
Restriction: Permission of EDUC-Education Policy and Leadership department.
Credit Only Granted for: EDPS732 or TLPL761.
Formerly: EDPS732.

TLPL762 Phenomenological Inquiry I (3 Credits)
Philosophic grounding for phenomenological inquiry at a beginning level Guided writing practice in doing phenomenological inquiry is provided on a selected lived experience phenomenon.
Credit Only Granted for: EDPS735 or TLPL762.
Formerly: EDPS735.

TLPL763 Phenomenological Inquiry II (3 Credits)
This advanced course in phenomenological methodology provides an expanded philosophic and methodological grounding for conducting phenomenological research. Attention is given to the development of phenomenological projects through the process of phenomenological writing. It is especially relevant for persons interested in the study of lived meanings in the domains of education, psychology, counseling, the health sciences and related academic and professional fields.
Prerequisite: TLPL762.
Credit Only Granted for: EDPS736 or TLPL763.
Formerly: EDPS736.

TLPL765 Quantitative Applicaltions for Education Policy Analysis (3 Credits)
Students use quantitative applications and secondary datasets to investigate social problems and education policies. Emphasis on the use of quasi-experimental designs and regression techniques to frame education issues, analyze, and recommend policies.
Prerequisite: EDMS645; or students who have taken courses with comparable content may contact the department.
Recommended: EDMS646; or EDMS651. Or EDMS646; and EDMS651.
Credit Only Granted for: EDPS703 or TLPL765.
Formerly: EDPS703.

TLPL766 Impact Evaluation for Education and Public Policy (3 Credits)
Students will learn about and practice using a variety of quantitative research methods that allow for causal inferences and can be applied to estimate the impact of policies or programs in education and other policy sectors.
Prerequisite: Knowledge of multivariate regression and prior experience with statistical programming software (e.g., Stata). TLPL765 or permission from instructor.
Credit Only Granted for: TLPL766, TLPL672, or EDPS621.
Formerly: TLPL672.

TLPL767 Law, Equity, and Diversity in Education (3 Credits)
An examination of 'dilemmas of difference' on selected issues that arise at the intersection of law and education policy. Dilemmas and value conflicts imbedded in modern federal and state case law dealing with race, gender, sexual orientation, religion and disability.
Credit Only Granted for: TLPL767 or EDPS751.
Formerly: EDPS751.

TLPL770 Black and Latino Education: History and Policy (3 Credits)
Examination of the historical legacies and contemporary policies that have contributed to the educational status (K-20) of Blacks and Latinos in the United States from the 19th century to the present. Issues surrounding language, immigration, racism, social class, and state and federal policies will also be analyzed.
Recommended: EDCI776; and completion of EDSP611 recommended.
Credit Only Granted for: EDCI786 or TLPL770.
Formerly: EDCI786.

TLPL771 Pedagogy of Teacher Education (3 Credits)
Illuminates and challenges the somewhat implicit pedagogies of teacher education that have existed over time, and aims to develop a more overt knowledge of where the field is, and should be, as we engage in the opportunities and challenges of teaching and teacher education in our current era. To do so, we examine teacher education as racialized, linguicized, and gendered, and as situated in larger political and power-laden contexts.
Restriction: Permission of department.
Credit Only Granted for: EDCI780 or TLPL771.
Formerly: EDCI780.

TLPL772 Teaching, Professional Development and School Change (3 Credits)
Examines currrent scholarship on professional development for K-12 teachers, characteristics of good professional development, and its relationship to teaching, learning, and school improvement.
Credit Only Granted for: EDCI784 or TLPL772.
Formerly: EDCI784.

TLPL773 Theory and Research in Social Studies Education (3 Credits)
A survey of the research literature; evaluation of research techniques; consideration of relevant instructional curriculum theory; evaluation of modern teaching methods and techniques.
Prerequisite: TLPL684; or TLPL685.
Credit Only Granted for: EDCI720 or TLPL773.
Formerly: EDCI720.

TLPL774 Urban Education (3 Credits)
This seminar provides students with a broad overview of urban education as a field of inquiry by examining the social context of urban schools, how transformative pedagogy is practiced and conceptualized as well as school reform.
Credit Only Granted for: EDCI776 or TLPL774.
Formerly: EDCI776.

TLPL775 Power, Privilege, Diversity and Teaching (3 Credits)
This course critically examines the theoretic foundation of multicultural education with particular emphasis on the relationship between power, privilege, diversity and teaching.
Credit Only Granted for: EDCI782 or TLPL775.
Formerly: EDCI782.

TLPL778 Scholarly Thought and Contemporary Curriculum (1-3 Credits)
Current curricular trends, issues, theory, and research in the light of past curricular and social thought.
Restriction: Permission of EDUC-Human Development and Quantitative Methodology department.
Repeatable to: 6 credits.
Formerly: EDPS738.

TLPL780 Contested Control: School Choice, Localism, and Centralization (3 Credits)
Taking the local school district as its field of inquiry, this course will examine a series of common, seemingly unobjectionable terms--"democracy," "markets," "choice," "public," "private," etc.--each of which represents very different visions of school governance and political organization. Readings will explore the nature of social justice, efficacy, and civic participation within school districts, and will do so not merely through a lens of power but of authority in the sense of moral legitimacy. Ultimately, the readings return to one simple question: Who should control the schools? Through its examination of school district governance, this course will prepare students for work in local and state policy. It will also approach issues from a variety of ideological perspectives and bolster students' knowledge of historical, philosophical, and political approaches to education.
Credit Only Granted for: TLPL788X or TLPL780.
Formerly: TLPL788X.

TLPL781 Policy and Politics of Education Reform (3 Credits)
Examines enduring issues embedded in the recurrent efforts to reform US public schools, such as: How do we achieve the "elusive ideal" of equitable educational opportunity for all students? How might we structure public school systems and develop their capacity to meet the multiple academic, social, economic, political, and cultural responsibilities governments assign to them? Under what conditions might market-based initiatives be a viable reform option? What sorts of education and social policies may be required to improve the learning experiences and life chances of children and youth in the US? This course provides opportunities to analyze prominent approaches to education reform (e.g. altering governance arrangements, expanding access and opportunity, improving instruction, instituting standards-based high stakes accountability systems, expanding school choice, privatizing the management and delivery of educational programs, linking school reform to more comprehensive social services and safety nets). It also provides opportunities to analyze the political forces that give rise to various genres of education reform proposals.
Credit Only Granted for: TLPL788F, PLCY732 or TLPL781.
Formerly: TLPL788F.

TLPL786 School Finance and Business Administration (3 Credits)
Introduction to principles and practices in the administration of the public school finance activity. Sources of tax revenue, the budget, and the function of finance in the educational program are considered.
Credit Only Granted for: EDPS676 or TLPL786.
Formerly: EDPS676.

TLPL788 Special Topics in Education (1-3 Credits)
Special and intensive treatment of current topics and issues in teaching, learning, policy and leadership.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Repeatable to: 6 credits.

TLPL789 Internship in Education (1-3 Credits)
Approved professional experiences with appropriate supervision. Open only to students admitted to approved master's and doctoral specializations.
Repeatable to: 3 credits if content differs.
Credit Only Granted for: EDPS789 or TLPL789.
Formerly: EDPS789.

TLPL790 Seminar in Mixed Methods Research in Education (3 Credits)
Examination of epistemological and methodological issues involved in conducting mixed methods studies in education. Students design and conduct analyses using existing datasets that include qualitative and quantitative data. They formulate appropriate research questions, consider alternative mixed methods designs, and address methodological complexities associated with working with qualitative and quantitative data in a single study.
Prerequisite: EDMS646; and (EDCI791 or EDHI700); and permission of EDUC-Teaching and Learning, Policy and Leadership department.
Recommended: EDCI792.
Credit Only Granted for: EDCI775 or TLPL790.
Formerly: EDCI775.

TLPL791 Qualitative Research I: Design and Fieldwork (3 Credits)
Examines the theoretical and epistemological moorings of different types of qualitative research. Students apply selected field research methods to problems of professional practice in schools and communities while considering central issues and dilemmas that arise while engaging in fieldwork.
Prerequisite: EDCI790.
Credit Only Granted for: EDCI791 or TLPL791.
Formerly: EDCI791.

TLPL792 Qualitative Research II: Analysis and Interpretation of Data (3 Credits)
Considers methods of on-going data analysis, ways of knowing and writing about field research, issues of reflexivity, and the ethical and political decisions involved in crafting text. Students read literature on and exemplars of multiple modes of qualitative data analysis and interpretation.
Prerequisite: TLPL791.
Credit Only Granted for: TLPL792 or EDCI792.
Formerly: EDCI792.

TLPL793 Methods of Discourse Analysis (3 Credits)
Surveys the various theoretical and methodological frameworks for doing discourse analytic investigations across disciplines.
Credit Only Granted for: EDCI788B or TLPL793.
Formerly: EDCI788B.

TLPL794 Foundations of Educational Research I (3 Credits)
An introduction to the "contested terrain" of education research. It examines major conceptual, methodological and political issues embedded in efforts to carry out education research and focuses on the development of the analytic dispositions and communication skills required to carry out research that meets the variously defined quality, utility and significance standards of scholarship in the field.
Restriction: Must be in Teaching and Learning, Policy and Leadership (Doctoral) program.
Credit Only Granted for: EDPS788P or TLPL794.
Formerly: EDPS788P.

TLPL795 Foundations of Educational Research II (3 Credits)
Students engage in the process of conceptualizing and completing a rigorous review of a section of literature in their area of specialization.
Restriction: Must be in Teaching and Learning, Policy and Leadership (Doctoral) program.
Credit Only Granted for: EDPS788T or TLPL795.
Formerly: EDPS788T.

TLPL798 Special Problems in Education (1-6 Credits)
Exploration of current problems in teaching, learning, policy and leadership. Available only to master's or doctoral candidates under the direction of their advisors.
Formerly: EDPL798.

TLPL799 Master's Thesis Research (1-6 Credits)
Formerly: EDPS799.

TLPL820 Seminar in Science Education (3 Credits)
Credit Only Granted for: EDCI870 or TLPL820.
Formerly: EDCI870.

TLPL828 Seminar in Mathematics Education (1-3 Credits)
Survey and analysis of literature on an identified research topic in mathematics education. Design and implementation of a research study to investigate the identified topic.
Repeatable to: 6 credits.
Credit Only Granted for: EDCI858 or TLPL828.
Formerly: EDCI858.

TLPL830 Seminar in English Education (3 Credits)
Credit Only Granted for: EDCI840 or TLPL830.
Formerly: EDCI840.

TLPL840 Seminar in Reading Education (3 Credits)
Credit Only Granted for: EDCI860 or TLPL840.
Formerly: EDCI860.

TLPL841 Research Methods in Reading (3 Credits)
Current research questions and methods culminating in a study suitable for submission to journals. Emphasis on using and conducting research.
Credit Only Granted for: EDCI861 or TLPL841.
Formerly: EDCI861.

TLPL860 Seminar on Case Study Methods (3 Credits)
Conceived as both an analysis of case study methods and a laboroatory for applying course content to research topics or projects of interest to students, it addresses a range of conceptual, methodological, ethical, political, and logistical issues embedded in efforts to conduct thoughtful, "disciplined" case study research. Since this focuses on case study research, it may be particularly helpful to students who are exploring various approaches to research or who are contemplating using case study methods in their theises and/or dissertations.
Prerequisite: TLPL690; or students who have taken courses with comparable content may contact the department.
Credit Only Granted for: EDPS730 or TLPL860.
Formerly: EDPS730.

TLPL861 Seminar in Social Studies Education (3 Credits)
Credit Only Granted for: EDCI820 or TLPL861.
Formerly: EDCI820.

TLPL862 Race, Class, and Social Justice: A Policy Seminar in Curriculum Theory and Development (3 Credits)
An advanced seminar focusing upon critical analyses of the themes, concepts, and language relevant to Curriculum Theory, Policy, and Research. Focus on education policy issues relating to race, class, and social justice with special reference to patterns of economic and cultural distribution, their impact upon persons at society's margins and on specific curricular responses to injustice.
Prerequisite: TLPL693.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDPS837 or TLPL862.
Formerly: EDPS837.

TLPL888 Apprenticeship in Education (1-8 Credits)
Apprentice practice under professional supervision in an area of competence compatible with the student's professional goals. Credit not to be granted for experience accrued prior to registration. Open only to degree- and certificate-seeking graduate students.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDPS888 or TLPL888.
Formerly: EDPS888.

TLPL889 Internship in Education (3-8 Credits)
Internship experiences at a professional level of competence in a particular role with appropriate supervision. Credit not to be granted for experience accrued prior to registration. Open only to students advanced to candidacy for doctoral degree.
Restriction: Permission of EDUC-Teaching and Learning, Policy and Leadership department.
Credit Only Granted for: EDPS889 or TLPL889.
Formerly: EDPS889.

TLPL898 Pre-Candidacy Research (1-8 Credits)
Credit Only Granted for: EDPS898 or TLPL898.
Formerly: EDPS898.

TLPL899 Doctoral Dissertation Research (1-8 Credits)
Registration required to the extent of 6-9 hours for an Ed.D. Project and 12-18 hours for a Ph.D. Dissertation.
Formerly: EDPS899.

TLTC - Teaching and Learning Transformation Center

TLTC499 Independent Study in Teaching and Learning (1-3 Credits)
Earn academic credit for the time spent supporting TLTC's educational development programs and/or engaging in the scholarship of teaching and learning.
Restriction: Permission of TLTC required - enrollment restriction.
Repeatable to: 6 credits.

TLTC699 Special Topics in University Teaching and Learning (1-3 Credits)
Special topics seminars for graduate students interested in university teaching and learning.
Restriction: Permission of TLTC-Teaching and Learning Transformation Center.
Repeatable to: 6 credits if content differs.

TLTC708 Independent Study: Learning Analytics Research Group (1-3 Credits)
A graduate level group research course designed to support independent study of learning analytics at the University of Maryland.
Restriction: Permission of instructor.
Repeatable to: 6 credits if content differs.

TLTC798 University Teaching and Learning (1-2 Credits)
Special topic courses directed at experienced graduate teaching assistants who are interested in university teaching and learning issues. Can be used by students for participation in the Universtiy Teaching and Learning Program.
Restriction: Permission of TLTC-Teaching and Learning Transformation Center.
Repeatable to: 6 credits if content differs.
Formerly: UNIV798.

TOXI - Toxicology

TOXI609 Methods in Toxicology (1-3 Credits)
Provides the opportunity for graduate students to become familiar with laboratory methods used by the staff to study the effect of toxins and environmental pollutants on living systems. Permission and credit arranged individually.
Restriction: Permission of CMNS-Chemical & Life Sciences department.
Repeatable to: 6 credits.

TOXI799 Masters Thesis Research (1-6 Credits)
Restriction: Permission of SPHL-Maryland Institute for Applied Environmental Health.

TOXI898 Pre-Candidacy Research (1-8 Credits)

TOXI899 Doctoral Dissertation Research (1-8 Credits)
Restriction: Permission of SPHL-Maryland Institute for Applied Environmental Health.

UMEI - Maryland English Institute

UMEI001 English as a Foreign Language: Beginning (12 Credits)
Intensive course for the non-native speaker of English who has little or no previous knowledge of English. Focus on the rapid acquisition of the basic features of English grammar and pronunciation and on speaking and understanding American English; reading and writing appropriate to the level will be included. Special fee required for this course. This course does not carry credit towards any degree at the University and does not count in the retention plan.
Restriction: Permission of EDUC-Dean-Maryland English Institute department.

UMEI002 English as a Foreign Language: Intermediate I (12 Credits)
Intensive course for the non-native speaker of English who has had some previous instruction in English. Emphasis on improving listening and speaking skills, on mastering intermediate grammatical structures, and on expanding vocabulary. Includes practice in reading and writing appropriate to the level. Special fee required for this course. This course does not carry credit towards any degree at the University and does not count in the retention plan.
Restriction: Permission of EDUC-Dean-Maryland English Institute department.

UMEI003 English as a Foreign Language: Intermediate II (12 Credits)
Intensive course for the non-native speaker of English who has mastered the essential structures of English grammar. Emphasis on improving communicative skills for a wide range of linguistic situations, on rapid expansion of vocabulary, and on improving reading comprehension and basic writing skills. Special fee required for this course. This course does not carry credit towards any degree at the University and does not count in the retention plan.
Restriction: Permission of EDUC-Dean-Maryland English Institute department.

UMEI004 English as a Foreign Language: Intermediate III (12 Credits)
Intensive course for the non-native speaker of English who has a good command of the basic features of spoken and written English. Emphasis on refining speaking and listening skills, on improving reading speed and comprehension of academic texts, and on developing writing skills for academic courses. Special fee required for this course. This course does not carry credit towards any degree at the University and does not count in the retention plan.
Restriction: Permission of EDUC-Dean-Maryland English Institute department.

UMEI005 Advanced English as a Foreign Language (6 Credits)
Semi-intensive course for the nearly proficient non-native speaker of English needing additional language instruction prior to undertaking full-time academic study. Speaking and listening skills; improvement of reading speed and comprehension; and development of writing skills. Special fee required for this course. This course does not carry credit towards any degree at the University and does not count in the retention plan.

UMEI011 Integrated English: Elementary (5 Credits)
English as a Second Language course for students at the elementary level.
Prerequisite: Placement exam; and permission of EDUC-Dean-Maryland English Institute department.

UMEI012 Integrated English: Intermediate (5 Credits)
English as a Second Language course for students at the intermediate level.
Prerequisite: Placement exam; and permission of EDUC-Dean-Maryland English Institute department.

UMEI013 Integrated English: Advanced (5 Credits)
English as a Second Language for students at the advanced level.
Prerequisite: Placement exam; and permission of EDUC-Dean-Maryland English Institute department.

UMEI028 Special Topics in English as a Second Language (1 Credit)
Focuses on particular English language topics for ESL student as indicated by title. Course intended to be taken concurrently with UMEI011, UMEI012, or UMEI013; but may be taken independently with special permission.
Repeatable to: 18 credits if content differs.

UNIV - University Courses

UNIV798 Special Topics Colloquium on University Teaching and Learning (1-3 Credits)
Special topic courses directed at experienced graduate teaching assistants who are interested in university teaching and learning issues. Can be used by students for participation in the Universtiy Teaching and Learning Program.
Restriction: Permission of UGST-Undergraduate Studies.
Repeatable to: 6 credits if content differs.

URSP - Urban Studies and Planning

URSP488 Selected Topics in Urban Studies (3 Credits)
Topics of special interest to advanced urban studies students.
Prerequisite: Permission of ARCH-Urban Studies & Planning Program department.
Repeatable to: 6 credits if content differs.

URSP600 Research Design and Application (3 Credits)
Techniques in urban research, policy analysis, and planning. Survey of descriptive and normative models. Objective and subjective measurements. Emphasis on assumptions of research.
Formerly: URSP602.

URSP601 Research Methods (3 Credits)
Use of measurement, statistics, quantitative analysis, and micro-computers in urban studies and planning.
Recommended: An undergraduate-level statistics course; and familiarity with Microsoft Excel.
Formerly: URBS601.

URSP603 Land Use Planning: Concepts and Techniques (3 Credits)
Land use concepts and definitions: legal context for planning; markets and planning; planning for housing; community services, employment, utilities, and transportation; zoning; subdivision regulations; growth management; plan implementation.
Credit Only Granted for: URSP603, URBS680, or URBS603.
Formerly: URBS603.

URSP604 The Planning Process (3 Credits)
Legal framework for U.S. planning; approaches to the planning process; tools and technology; systems thinking; defining problems and issues; soliciting goals and values; developing and making good presentations; public participation; developing and evaluating alternatives and scenarios; plan evaluation; developing RFPs.
Credit Only Granted for: URSP604, URBS656, or URBS604.
Formerly: URBS604.

URSP605 Planning History and Theory (3 Credits)
Examination of key, selected major events and issues in U.S. planning history and the development of the Yplanning profession; exploration of major themes in planning theory and practical applications of them; and analysis of the relationship of history and theory.

URSP606 Planning Economics (3 Credits)
Resource allocation in a market economy, the nature of market failures, and the justifications for public sector intervention. The limits and possibilities for planning in a market economy.
Restriction: Must not have completed URSP630.
Credit Only Granted for: URSP606, URBS606, or URBS630.
Formerly: URBS606.

URSP631 Transportation and Land Use (3 Credits)
The interrelationship between transportation and land use. What are the impacts of various transportation modes on land use patterns, and how can land use solutions influence travel demand. The integration of transportation into master planning and site impact analysis. Using quantitative methods to understand the land use and transportation linkage.
Credit Only Granted for: URSP631 or URSP688L.
Formerly: URSP688L.

URSP640 Growth Management and Environmental Planning (3 Credits)
Topics associated with growth management, defined as policies and strategies by which governments attempted to control the amount, location, pace, pattern and quality of development within their jurisdictions.

URSP661 City and Regional Economic Development Planning (3 Credits)
Spatial patterns of employment and populations, and models of urban and regional growth and decline. Focus on application of economic theory and urban planning techniques to issues of local economic development and planning.
Prerequisite: URSP606 or URSP660.
Credit Only Granted for: URSP661, URBS440, or URBS661.
Formerly: URBS661.

URSP664 Real Estate Development for Planners (3 Credits)
Planning, Architectural and Public Policy students are introduced to the real estate development process primarily from the point of view of the private entrepreneurial developer. It will include the steps in undertaking a real estate development from the initial concept to the property management and final disposition, the basic financial and tax concepts underlying real estate development, a review of national housing policy,including public-private partnerships, and solving specific real estate development problems using financial spread-sheets.
Prerequisite: URSP606.
Credit Only Granted for: URSP664 or URSP688F.
Formerly: URSP688F.

URSP671 Politics and Planning (3 Credits)
Examination of the practice of planning as a technical and a practice role. Attitudes of planners toward plan implementation. Development of effective roles for professional planners.
Formerly: URSP691.

URSP673 Community Development (3 Credits)
Examines and identifies planning approaches and methods that can help communities - particularly low income communities - become stronger, more cohesive, and more capable of serving their interests. Examines urban poverty; urban politics; history, concepts and practice of community development; and community development approaches and methods.

URSP688 Recent Developments in Urban Studies (2-6 Credits)
Examination of selected current aspects of urban affairs and planning, including, for example, <"new towns"> in the United States or neighborhood preservation in Russia. Location of course may be off-campus.
Formerly: URBS688.

URSP705 Summer Community Planning Studio I (4 Credits)
Intensive community planning group field work, typically five days a week for four weeks. Often outside the USA. Application of class work to actual planning and policy challenges. Students seeking to meet the URSP studio requirement must also take URSP 706.
Restriction: Permission of instructor.

URSP706 Summer Community Planning Studio II (2 Credits)
Intensive analysis and report-preparation of work completed in URSP 705. Held in College Park. Students seeking to meet the URSP studio requirement must also take URSP 705.
Restriction: Permission of instructor.

URSP708 Community Planning Studio (2-6 Credits)
The Community Planning Studio is a "capstone" course intended to provide students with an opportunity to apply their knowledge and skills to analyze current, pressing planning issues, in a selected community and to produce a report containing recommendations for addressing those issues. In essence, students act as a consulting team for a community client.
Prerequisite: URSP605, URSP604, URSP601, and URSP600; and permission of ARCH-Urban Studies & Planning Program department.
Repeatable to: 6 credits.
Credit Only Granted for: URSP704 or URSP708.
Formerly: URSP704.

URSP709 Field Instruction (3-6 Credits)
Students will satisfy a 300-hour internship (20 hours for 15 weeks during the spring, 25 hours a week for 12 weeks during the summer). Suitable internships are approved by the Internship Coordinator or Instructor; they involve a significant amount of planning work (preferably in the student's are of interest) and provide an appropriate on-site supervisor. The Internship Coordinator will assist students in finding a suitable internship, but the ultimate responsibility rests with each student. Whether the internship is paid or not is a matter to be worked out between the student and the organization.
Prerequisite: URSP605, URSP604, and URSP600; or permission of ARCH-Urban Studies & Planning Program department.
Repeatable to: 6 credits.
Credit Only Granted for: URSP703 or URSP709.
Formerly: URSP703.

URSP710 Research Seminar: Urban Theory and Issues (3 Credits)
An advanced research seminar for M.A. and M.C.P. students preparing their final research projects.
Prerequisite: 15 credits in URSP courses.
Restriction: Must be in Urban and Regional Planning and Design (Doctoral) program.
Formerly: URBS710.

URSP788 Independent Study in Urban Studies and Planning (1-3 Credits)
Directed research and study of selected aspects of urban affairs.
Repeatable to: 6 credits if content differs.
Formerly: URBS788.

URSP798 Readings in Urban Studies and Planning (1-3 Credits)
Directed readings in selected aspects of urban affairs and planning.
Repeatable to: 6 credits if content differs.
Formerly: URBS798.

URSP799 Master's Thesis Research (1-6 Credits)
Formerly: URBS799.

URSP804 Advanced Planning Theory (3 Credits)
Relations between theory and practice in planning. Ways of developing and using knowledge in collective action. Challenges to organizing for planning, finding knowledge useful for planning and balancing social attachments with free inquiry.

URSP805 Seminar in Research Design (3 Credits)
Addresses fundamental aspects of research desing for Ph.D students in urban planning and policy-related fields. Topics include principles of research design, formulating a feasible hypothesis and identifying appropriate methodology for testing hypotheses eg. qualitative methods, quantitative methods, survey research. Writing of proposals and dissertation. Publication, presentation, and funding.
Prerequisite: URSP804 and URSP810.

URSP810 Contemporary Metropolitan Issues (3 Credits)
Introduces Ph.D. students to current metropolitan issues. Focus is on the historical development of the issue, problem definition, methodological approaches to its study, methodological dilemmas, and the ways that different conclusions are translated into policy. Topics vary from semester to semester but include such topics as the spatial mismatch hpothesis, the impact of urban design and form on travel behavior, the impact of technology on urban form, the justification for historic preservation, and sustainable development.
Restriction: Must be in Urban and Regional Planning and Design (Doctoral) program.

URSP898 Pre-Candidacy Research (1-8 Credits)
Selected topics in Urban Studies and Planning. Topics will vary with the instructor.
Repeatable to: 6 credits if content differs.

URSP899 Doctoral Dissertation Research (1-8 Credits)
This course is a required course for the Ph.D program in Urban and Regional Planning and Design.

USLT - Latina/o Studies

USLT401 Latinas/os and US Popular Culture (3 Credits)
An examination of the relationship between Latinas/os and popular culture in the United States. Using theoretical lenses drawn from cultural studies, visual culture studies, critical race theory, borderlands theory, and feminism, the course analyzes multiple texts from time frames past and present. Explores issues such as exclusion from and inclusion within US identity, transnational identifications and cultural flows, ethnoracial stereotyping and resistance to it, and intersections of Latina/o identity with aspects of class, race, sexuality, and gender. Investigates art, TV, music, cinema, and everyday lived experience.
Credit Only Granted for: USLT401, USLT498B, or AMST498M.
Formerly: USLT498B.

USLT403 Citizens, Refugees, and Immigrants (3 Credits)
Citizenship, Refugee and Immigrant are guiding categories that often define the Latina/o community in the United States. Employing this analytical lens, this course critically engages with notions of exclusion and inclusion, which included documentation, status, race, gender, and power. To better understand how these ideas and processes work, students are introduced to the history of Latina/o migration, US immigration policies, racial formation theory, gender construction, borderland theory, and the politics of territoriality.
Credit Only Granted for: USLT403, USLT498I, AMST498N, or IMMR419D.
Formerly: USLT498I.

USLT420 U.S. Latinas/os on the Silver Screen: The Silent Era to the Present Day. (3 Credits)
Combining media theory and film history, this course considers the film industry's relationship to Latinidad, examining issues such as the shift from silent film to sound, the impact made on Latina/o images by the Second World War, and Latinas/os in the Red Scare. The second half of the course turns its attention to self-representation by Latina/o filmmakers and empathetic images created by whites in and after the 1970s. Some of the questions that the course addresses include: How have Latinas/os been depicted in Hollywood history? How have inter-American foreign relations shaped the US Latina/o image? How have Latina/o filmmakers confronted issues such as racism and sexism in the United States?
Credit Only Granted for: USLT420, USLT498A or AMST498G.
Formerly: USLT498A.

USLT430 Globalization and the Diversifying U.S. (3 Credits)
While often talked about as a recent phenomenon and one focused on capital, the ebbs and flows of globalization has a long history among Latina/o communities in the United States. The impact and consequences of globalization can be seen in US foreign policy in Latin America. For instance, Operation Bootstrap in Puerto Rico and the Maquiladores on the Mexico and U.S. border. At the same time, it has shaped immigration policies and the social. political and cultural experiences of Latina/o workers in the U.S. Often blamed for "taking " jobs, this course takes a deeper look at the concrete reasons for the rise of globalism and its impact on Latina/o communities in the US.
Credit Only Granted for: USLT430, USLT498N, AMST498W, or IMMR419J.
Formerly: USLT498N.

USLT488 US Latina/o Senior Seminar (3 Credits)
A variable topics seminar that exposes students to interdisciplinary critical readings, writings, and research in U.S. Latina/o Studies. Interdisciplinary research methodologies are broadly addressed. Students will gain skills and practice in reading critical analytic texts and will develop writing skills.
Recommended: USLT202 or USLT201.
Restriction: Senior standing; and permission of instructor.
Repeatable to: 9 credits if content differs.

USLT498 US Latina/o Studies: Special Topics (3 Credits)
Specific content to be announced when courses are offered.
Prerequisite: USLT202 or USLT201.
Restriction: Junior standing or higher.
Repeatable to: 9 credits if content differs.

VMSC - Veterinary Medical Sciences

VMSC600 Infectious Disease Diagnosis and Interpretation (1 Credit)
A broad exposure to many different diagnostic techniques, the appropriate use of the tests, how they are to be interpreted and the possible consequences of the diagnosis.

VMSC610 Recombinant Viral Vectors (3 Credits)
A comprehensive presentation of information on the molecular biology of the most relevent viral vectors developed to date and give insight on vector contruction, purification and utilization. Also intended for students in virology and related fields as well as to those interested in the application of viral vectors to basic research.
Restriction: Permission of instructor.

VMSC660 Emerging and Re-emerging Infectious Diseases (2 Credits)
The global burden of emerging and re-emerging infectious diseases is growing and prompts the need for effective control of these pathogens. The objective of this course is to provide graduate students with knowledge of pathogenesis and transmission of globally evolving pathogens. Registered students for this course are expected to know fundamentals of infectious diseases. References from the peer reviewed journals will be provided to facilitate understanding of the selected topics. Opening of this course is necessary to help graduate students to stay up-to-date with currently emerging pathogens and their evolution with changes in environment. This course is complementary to other existing microbiology courses (i.e., Viral Pathogenesis) on campus. Lectures focus on an in-depth analysis of a variety of topics in current infectious diseases. The course highlights recently published literatures to evaluate evolving trends in infectious diseases. The covered topics include subjects related with various pathogens and their adaptation strategy to enhance pathogenicity and transmissibility. The lectures will also cover the control and prevention measures of these pathogens.

VMSC670 Molecular Epidemiology of Infectious Diseases (2 Credits)
Molecular epidemiology is a discipline that uses molecular microbiology tools to study the distribution and determinants of diseases in human and animal populations. This course will provide a comprehensive overview and detailed discussion of the core molecular approaches and recent technological advances that are and can be used to investigate the etiology, transmission, and control of infectious diseases in veterinary medicine and public health. Theoretical and practical aspects of various molecular biology methods will be discussed in the context of epidemiological studies of infectious diseases including both bacterial and viral infections of veterinary and zoonotic significance. Lecture topics will cover the principles and application of various molecular techniques to problems of infectious diseases; population and evolutionary genetics of pathogenic microorganisms; data analysis and interpretation. Lecture materials will also be supported with practical data analysis, literature review discussions, which will be student-driven that will critique relevant manuscripts via group discussions in the classroom.
Prerequisite: Students planning to take this course are expected to have had some backgrounds in infectious diseases and molecular biology.
Cross-listed with: EPIB670.

VMSC688 Special Topics in Veterinary Medical Sciences (1-4 Credits)
Lectures and discussions on current topics in veterinary medicine s as animal disease surveillance, risk analysis, molecular epidemiolo or fish pathology. Targeted at veterinary medicine (DVM) students a other graduate students with a background in veterinary medical sciences.
Prerequisite: Permission of AGNR-Veterinary Medicine Program department.
Repeatable to: 8 credits.

VMSC689 Use of Genomics and Proteomics in Infectious Disease (3 Credits)
Focus is placed on current biotechnological development and recent research breakthroughs in the field of genomics and proteomics as it relates to infectious disease and drug/vaccine development.
Recommended: BCHM463; and (BSCI330 or BSCI230). Or by Permission.
Repeatable to: 6 credits if content differs.

VMSC698 One Health Seminar (1-3 Credits)
"One Health" is an approach that recognizes that health of people is closely connected to health of animals and our shared environment. Outstanding leaders in the field will present ideas for analysis and discussion among class members. Topics will include presentation and discussion of scientific publications, current topics, and new methodologies.
Prerequisite: Permission of AGNR-Veterinary Medicine Program department.
Repeatable to: 6 credits.

VMSC699 Special Problems in Veterinary Medical Sciences (1-4 Credits)
Independent study of a specific problem related to veterinary medicine such as a disease outbreak, application of a new diagnostic test or a risk analysis related to animal health. Targeted at veterinary medicine (DVM) students and other graduate students with a background in veterinary medicine.
Prerequisite: Permission of faculty mentor.
Repeatable to: 8 credits.

VMSC700 Animal Health Policy and Communication (3 Credits)
An introduction to animal health policy with emphasis on understanding how science and politics interact and influence animal health policy and how veterinarians and animal scientists can effectively communicate science to non-scientists such as legislators and policymakers.
Recommended: ANSC225 and ANSC340.
Restriction: Must be in a major in AGNR-VA-MD Regional Col Veterinary Med; or must be in a major within the AGNR-Animal & Avian Sciences department; or must be in a major in PUAF-School of Public Policy; or permission of AGNR-VA-MD Regional Col Veterinary Med.

VMSC705 Genetics of Animal Viruses (2 Credits)
An advanced course that covers the structure and complexity of viral genomes, genome replication and expression, virus-host interactions, virus evolution, genetic principles and methodology applicable to animal viruses.

VMSC720 Viral Pathogenesis (2 Credits)
This course will teach graduate students about mechanisms of infections by animal and human viral pathogens, including virus-cell interactions, host responses, and consequences of virus infection. Particular attention will be focused on the molecular mechanisms of the interactions between virus and host.

VMSC758 Journal Club in Comparative Biomedical Sciences (1 Credit)
The Journal Club in Comparative Biomedical Sciences is a graduate-level student-driven course. Each student will pick a peer-reviewed journal article for individual presentation and group discussion. The articles will cover a wide variety of biomedical science topics based on student and group interests.
Repeatable to: 6 credits if content differs.

VMSC760 Immunology of Infectious Diseases (3 Credits)
An advanced graduate level course that focuses on the cutting-edge knowledge of immunity and recent research breakthroughs in the interactions between host immune system and infectious pathogen, and vaccine development

VMSC770 Advanced Topics in Immunology (2 Credits)
The objective of the course is to provide students with the advanced and cutting-edge knowledge and techniques of immunology as well as research advancement in important immunologic topics. A selection of immunology area will be specifically selected with emphasis on recent research breakthroughs in the field. Therefore, the topics will be different each academic year.
Prerequisite: VMSC760; or permission of instructor.

VMSC780 Parasites of Medical and Veterinary Importance (2 Credits)
Provides students with the basic knowledge of parasites as well as research advancement in important parasites of humans and animals. Particular attention will be given to parasite biology, pathogenesis, and host responses to parasitic infection. A selection of parasites of medical and veterinary importance will be specifically covered with emphasis on recent research breakthroughs in the field.
Restriction: Permission of instructor.

VMSC799 Thesis Research (1-6 Credits)
Repeatable to: 99 credits if content differs.

VMSC898 Pre-Candidacy Research (1-8 Credits)

VMSC899 Dissertation Research (1-8 Credits)
Repeatable to: 99 credits if content differs.

WMST - Women's Studies

WMST400 Theories of Feminism (3 Credits)
A study of the multiplicity of feminist theories which have been developed to explain women's position in the family, the workplace, and society. Major feminist writings are considered in the context of their historical moment and in the context of the intellectual traditions to which they relate.
Prerequisite: 1 course in WMST; or must have completed a course cross-listed with a WMST course.

WMST408 Literature by Women Before 1800 (3 Credits)
Selected writings by women in the medieval and early modern era.
Prerequisite: Must have completed two English courses in literature; or permission of the Harriet Tubman Department of Women, Gender, and Sexuality Studies.
Repeatable to: 9 credits if content differs. Cross-listed with: ENGL408.
Formerly: WMST408.

WMST410 Women of the African Diaspora (3 Credits)
Explores the lives, experiences, and cultures of women of Africa and the African diaspora--African-America, the Caribbean, and Afro-Latin America. A variety of resources and materials will be used providing a distinctive interdisciplinary perspective.
Credit Only Granted for: WMST410 or WGSS410.
Formerly: WMST410.

WMST425 Gender Roles and Social Institutions (3 Credits)
Relationship between gender roles and the structure of one or more social institutions (e.g., the economy, the family, the political system, religion, education). The incorporation of gender roles into social institutions; perpetuation or transformation of sex roles by social institutions; how changing gender roles affect social institutions.
Credit Only Granted for: SOCY425, WMST425 or WGSS425.
Formerly: WMST425.

WMST428 Topics in Women, Gender, and Sexuality Studies (1-3 Credits)
Thematic exploration of a topic in women, gender, and sexuality studies.
Repeatable to: 9 credits if content differs.
Formerly: WMST428.

WMST444 Feminist Critical Theory (3 Credits)
Issues in contemporary feminist thought that have particular relevance to textual studies, such as theories of language, literature, culture, interpretation, and identity.
Prerequisite: WMST200, WGSS200, WMST250, WGSS250, or ENGL250. Cross-listed with: ENGL444.
Credit Only Granted for: ENGL444, WMST444 or WGSS444.
Formerly: WMST444.

WMST448 Literature by Women of Color (3 Credits)
Literature by women of color in the United States, Britain, and in colonial and post-colonial countries.
Prerequisite: Must complete two English courses in literature; or permission of the Harriet Tubman Department of Women, Gender, and Sexuality Studies.
Repeatable to: 9 credits if content differs. Cross-listed with: ENGL448.
Formerly: WMST448.

WMST452 Women in the Media (3 Credits)
Participation and portrayal of women in the mass media from colonial to contemporary times.Cross-listed with: JOUR452.
Credit Only Granted for: JOUR452, WMST452 or WGSS452.
Formerly: WMST 452.

WMST454 Women in Africa (3 Credits)
The place of women in African societies: the role and function of families; institutions such as marriage, birthing, and child rearing; ritual markers in women's lives; women in the workplace; women's associates; women's health issues; measures designed to control women's behavior; women and development.
Credit Only Granted for: HIST494, WMST454 or WGSS454.
Formerly: WMST454.

WMST455 Women in Medieval Culture and Society (3 Credits)
Medieval women's identity and cultural roles: the condition, rank and rights of medieval women; their access to power; a study of women's writings and the constraints of social constructs upon the female authorial voice; and contemporary assumptions about women.Cross-listed with: HIST495.
Credit Only Granted for: HIST495, WMST455 or WGSS455.
Formerly: WMST455.

WMST456 Women and Society in the Middle East (3 Credits)
Examines the customs, values and institutions that have shaped women's experience in the Middle East in the past and in the contemporary Middle East.
Recommended: Prior coursework in Middle East studies or gender studies. Cross-listed with: HIST492.
Credit Only Granted for: HIST492, WMST456 or WGSS456.
Formerly: WMST456.

WMST457 Redefining Gender in the U.S., 1880-1935 (3 Credits)
Exploring changing perceptions of gender in the U.S., 1880-1935, and the impact of those changes on the day to day lives of men and women.
Credit Only Granted for: WGSS457 or WMST457.
Formerly: WMST457.

WMST458 Literature by Women After 1800 (3 Credits)
Selected writings by women after 1800.
Prerequisite: Must have completed two English courses in literature; or permission of Harriet Tubman Department of Women, Gender, and Sexuality Studies.
Repeatable to: 9 credits if content differs. Cross-listed with: ENGL458.
Formerly: WMST458.

WMST468 Feminist Cultural Studies (3 Credits)
Each version of this course focuses on one or several forms of popular culture -- such as TV, music, film, cyber-culture, or genre fiction (for example, science fiction) -- and demonstrates how feminists value, critique and explain such forms. Tools of feminist cultural studies include economic and social analyses of power, race, sexuality, gender, class, nationality, religion, technology, and globalization processes.
Repeatable to: 9 credits if content differs.
Formerly: WMST468.

WMST469 Study Abroad Special Topics IV (1-6 Credits)
Special topics course taken as part of an approved study abroad program.
Repeatable to: 15 credits if content differs.
Formerly: WMST469.

WMST471 Women's Health (3 Credits)
The women's health movement from the perspective of consumerism and feminism. The physician-patient relationship in the gynecological and other medical settings. The gynecological exam, gynecological problems, contraception, abortion, pregnancy, breast and cervical cancer and surgical procedures. Psychological aspects of gynecological concerns.
Restriction: Must be in a program in the Harriet Tubman Department of Women, Gender, and Sexuality Studies; or must be in a major within SPHL-Behavioral & Community Health department. Cross-listed with: HLTH471.
Credit Only Granted for: HLTH471, WMST471, or WGSS471..
Formerly: WMST471.

WMST486 Advanced Feminist, Critical Race, and Queer Theories (3 Credits)
Provides undergraduates with a survey of foundational texts in the intersecting fields of feminist, critical race, and queer studies, as well as an overview of current scholarship in order to give students an opportunity to understand the origins and the development of these fields. This course is especially recommended for students interested in pursuing graduate education. Our discussions will be focused on the trajectories of these intellectual conversations as they have developed in the academy.
Prerequisite: WMST301 or permission of the Harriet Tubman Department of Women, Gender, and Sexuality Studies.

WMST487 Advanced Research Seminar in Gender, Race, and Queer Studies (3 Credits)
A research seminar that allows students to focus their developed skills on a single topic of their own choosing while meeting regularly in seminar to discuss, critique, support, and learn from their peers' projects and assessments. Students choose a topic based on their own interests and prior coursework, perform advanced research appropriate to the question, and formulate an appropriate method of presentation of their research findings. The culminating presentation may take the form of a written paper or a creative, digital, or activist project.
Prerequisite: WMST300 or WGSS301; and WMST400 or WGSS302.
Credit Only Granted for: WMST487 or WGSS487.
Formerly: WMST487.

WMST488 Senior Seminar (3 Credits)
Seminar for advanced majors in women's studies or other students with appropriate preparation. Interdisciplinary topics will vary each semester.
Restriction: Permission of the Harriet Tubman Department of Women, Gender, and Sexuality Studies.
Repeatable to: 9 credits if content differs.
Formerly: WMST488.

WMST491 Judaism and the Construction of Gender (3 Credits)
The study of Jewish culture, religious practice, communal authority, and literature through the frame of such critical categories of analysis as gender, sexuality, masculinity, power, ethics, and the feminine.
Prerequisite: 1 course in JWST; or 1 course in LGBT; or 1 course in WMST or WGSS. Cross-listed with: JWST491.
Credit Only Granted for: JWST491, WMST491 or WGSS491.
Formerly: WMST491.

WMST494 Lesbian Communities and Differences (3 Credits)
The meanings of lesbian communities across many lines of difference. Using lesbian-feminists of the 1970s as a starting point, we will look both back and forward in history, tracing changes and exploring the meanings of these in their social and historical contexts.
Prerequisite: 1 course in LGBT, WMST, or WGSS. Cross-listed with: LGBT494.
Credit Only Granted for: LGBT494, WMST494 or WGSS494.
Formerly: WMST494.

WMST496 African-American Women Filmmakers (3 Credits)
Examines the cinematic artistry of African-American women filmmakers and the ways in which these films address the dual and inseparable roles of race and gender.
Credit Only Granted for: WMST496 or WGSS496.
Formerly: WMST496.

WMST497 Professional Development (1 Credit)
To assist students in thinking about the next step post-undergraduate degree and to think long term about the importance of their WMST degree in lifelong career, personal, and political development. This course will provide students an opportunity to reflect upon where they are going beyond the B.A. and develop ways to communicate how their coursework and experiences at UMD have prepared them for the next step. The course will focus on the practicalities of resume writing, internship or job searches, etc. but also on the specific challenges/opportunities of translating interdisciplinary training to professional internship or beyond-the B.A. sites. Students may take this course in preparation for their internship (working to select an appropriate internship that can translate well to post-undergraduate aspirations) or they may take it post-internship as they determine their post-graduation steps.
Prerequisite: 12 credits in LGBT, WMST or WGSS courses.
Restriction: Must have completed a minimum of 75 credits.
Credit Only Granted for: WMST497 or WGSS497.
Formerly: WMST497.

WMST498 Advanced Special Topics in Women, Gender, and Sexuality Studies (1-3 Credits)
Advanced study of a thematic topic in women, gender, and sexuality studies.
Restriction: Permission of the Harriet Tubman Department of Women, Gender, and Sexuality Studies.
Repeatable to: 9 credits if content differs.
Formerly: WMST498.

WMST498W Sex, Gender, and Jewish Identity (3 Credits)
An exploration of Jewish embodiment, including dynamics related to biological sex, culturally-framed gender, and sexuality. Topics of discussion may include transgender and intersex Jews, stereotypes and gender performance, modesty, genetics, and body alteration. Focus is on contemporary Jewish culture, framed within the larger historical and textual tradition.
Prerequisite: 1 course in WMST; or 1 course in JWST; or 1 course in LGBT; or permission of instructor. Cross-listed with: JWST492, LGBT448W.
Credit Only Granted for: JWST492, JWST409G, JWST419W, LGBT448W, or WMST498W.
Formerly: JWST409G and JWST419W.

WMST499 Independent Study (1-3 Credits)
Research and writing or specific readings on a topic selected by the student and supervised by a faculty member of the Women's Studies Department.
Prerequisite: 1 course in WMST or WGSS.
Restriction: Permission of the Harriet Tubman Department of Women, Gender, and Sexuality Studies.
Repeatable to: 9 credits if content differs.
Formerly: WMST499.

WMST601 Approaches to Women's Studies I (3 Credits)
Examines two fundamental concepts in women's studies: intersectionality and interdisciplinarity. Looks at how feminisms have shaped and been shaped by knowledge-production within and across disciplinary boundaries, cultures, and paradigms. Develops an appreciation of intersectional theory as a critical research tool and as a set of responses to issues of power, domination, oppression and other loci of difference.
Prerequisite: WMST400; or students who have taken courses with comparable content may contact the department.

WMST602 Approaches to Women's Studies II (3 Credits)
Continued examination of intersectionality and interdisciplinarity with emphasis on the politics of knowledge production and identity.
Prerequisite: WMST400; or students who have taken courses with comparable content may contact the department.

WMST618 Feminist Pedagogy (3 Credits)
Examines the higher education classroom from a feminist perspective through theory and analysis. Students are graduate teaching assistants with the Women's Studies department.
Restriction: Permission of ARHU-Women's Studies department.

WMST619 Women's Studies Teaching Practicum (1 Credit)
Provides Women's Studies graduate teaching assistants with ongoing regular faculty supervision during the semesters the students are teaching WMST courses.
Prerequisite: Permission of ARHU-Women's Studies department; and WMST618; and must be a current WMST teaching assistant.
Repeatable to: 12 credits if content differs.

WMST621 Feminist Theories and Women's Movements: Genealogies (3 Credits)
Examines theories to explain the matrix of domination from the nineteenth century to the present. Students learn the key debates that produceed new insights and shifted the ground of subsequent feminist theorizing within multi-racial feminisms. Examines those debates within global perspectives. Examines how dominant theoretical frameworks have been developed at specific historical moments.
Prerequisite: WMST400; or permission of ARHU-Women's Studies department.

WMST628 Women's Studies Colloquium (1 Credit)
An intensive advanced exploration of current problems and issues in women's studies.
Repeatable to: 12 credits if content differs.

WMST698 Special Topics in Women's Studies (1-3 Credits)
Advanced worik in selected topics in Women's Studies.
Prerequisite: WMST400; or students who have taken courses with comparable content may contact the department.
Repeatable to: 6 credits if content differs.

WMST699 Independent Study (1-3 Credits)
Research and writing on specific readings on a topic selected by the student which is approved and supervised by a faculty member of the Women's Studies Department.
Restriction: Permission of instructor.

WMST708 Research Seminar in Women's Studies (3 Credits)
This seminar provides an opportunity for those students interested in pursuing feminist research and teaching to synthesize and explore feminist analyses of university life, including research and writing methods, learning styles, curricular issues, and the "chilly climate" for women.
Restriction: Permission of instructor.
Repeatable to: 9 credits if content differs.

WMST709 Directed Independent Reading for Major Field Exam (1-4 Credits)
Directed reading in preparation for Major Field Exam. In consultation with their advisors, students identify, analyze, critique and synthesize material relevant to their major fields of inquiry. Grading will be based on combinations of oral performance in the bi-weekly meetings, production of annotated bibliographies and synthetic papers.
Restriction: Permission of ARHU-Women's Studies department.

WMST799 Masters Thesis Research (1-6 Credits)
Repeatable to: 9 credits.

WMST898 Pre-Candidacy Research (1-8 Credits)

WMST899 Doctoral Dissertation Research (1-8 Credits)
Repeatable to: 10 credits if content differs.

POLICIES

- Admissions Policies (p. 999)
- Registration Policies (p. 1003)
- Tuition, Fees, and Expenses (p. 1008)
- Policies for Graduate Assistantships (p. 1010)
- Graduate Student Fellowships (p. 1018)
- Academic Record (p. 1022)
- Master's Degrees Policies (p. 1026)
- Doctor of Philosophy Degree Policies (p. 1031)
- Professional Practice Doctoral Degree Policies (https://academiccatalog.umd.edu/graduate/policies/professional-practice-doctoral-degrees-policies/)
- Combined Bachelor's-Master's Degrees (p. 1037)
- Dual Master's Degrees (https://academiccatalog.umd.edu/graduate/policies/dual-masters/)
- Dual Doctoral and Master's Degrees (p. 1037)
- Graduate Certificate Policies (p. 1038)
- Graduate School Field Committees (p. 1038)
- Graduate Faculty Members (p. 1039)
- Other Graduate School Policies (p. 1040)
- Graduate School Services (p. 1048)
- Appendices (p. 1050)
- Resources (p. 1051)

Admissions Policies

Admission to Graduate School

Responsibility for admitting applicants to graduate programs rests with the Dean of the Graduate School. Academic department and program offices review admissions applications and credentials and make admissions recommendations to the Graduate Dean. In cases where credentials were earned abroad, the Graduate School admissions staff will evaluate to ensure that the applicant has the equivalent of an accredited 4 year U.S. baccalaureate degree. The standards maintained by the Graduate School and individual departments and programs are applied to ensure that applicants admitted to the University are well qualified and trained to study at this institution and have a reasonable expectation of successfully completing a graduate program. Standards for admission to doctoral degree programs are frequently higher than those for admission to master's degree programs. In many degree programs, the number of applications received from individuals qualified for graduate study regularly exceeds the number of applicants who can be accommodated. In such cases, only the most highly qualified are offered admission. The number of spaces available in various departments is limited according to the availability of faculty, special resources, and funds for students requiring financial assistance.

Criteria for Admission

Those applicants who have earned or will earn a bachelor's degree at a regionally accredited college or university in the United States (or the equivalent of a baccalaureate degree from a nationally recognized institution in another country) are eligible to be considered for admission to the Graduate School at the University of Maryland. With the exception of established dual-degree programs, an applicant can matriculate in only one graduate program at a time.

Admission to graduate programs is highly competitive, and space is limited. The decision to admit an applicant to a program is based primarily on a combination of the following criteria, evaluated from a complete application:

- **Quality of previous undergraduate and graduate work**. The Graduate School requires as a minimum standard an average of 3.0 on a 4.0 scale in all undergraduate courses taken at a regionally accredited college or university. Adequate performance in prerequisite courses is required. Applicants with international credentials must submit in the original language those academic records that are not written in English. Such credentials must be accompanied by a literal English translation. Both must be submitted by the published international application submission deadline for the degree or certificate program. Original copies must be submitted to the Graduate School before the completion of the first term (semester or 12-week term) of enrollment.
- **Strength of letters of recommendation from persons competent to judge the applicant's probable success in graduate school**. These letters are usually from the applicant's former professors who are able to give an in-depth evaluation of the applicant's strengths and weaknesses with respect to academic work. Additional recommendations may come from employers or supervisors who are familiar with the applicant's work experience.
- **Scores on a nationally standardized examination**. The three most widely used standardized examinations are the Graduate Record Examination (GRE), the Graduate Management Admissions Test (GMAT) and the Miller Analogies Test (MAT). Because the predictive utility of these test scores may vary from one group of applicants to another, a discriminating use of all relevant materials will be made in each applicant's case. The TOEFL, IELTS Academic, or PTE Academic are required of international applicants who are not native speakers of English. More information on English Proficiency requirements can be found on our Graduate School website (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements/).
- **Applicant's statement of his or her academic career objectives and their relation to the intended program of study**. These statements help the program to identify students whose goals are consonant with the program's objectives and expertise.
- **Other evidence of potential success in graduate studies**. Some programs require other evidence of potential for success in graduate study, such as a portfolio of creative work, completion of specialized examinations, personal interviews, or an example of scholarly work.
- **Availability of an advisor in the applicant's specific field, available space in the program, and competitive rating within the applicant pool for the given term of entry.**

  Prospective students may apply for admission to the University of Maryland during or after their final year of undergraduate study but must furnish proof of graduation before the end of their first term (semester or 12-week term) of enrollment at the University. Students applying for admission to a graduate degree program in a field of specialization in which they already hold that same degree or its equivalent may do so only if the previous degree program was of substantially different character or was not accredited. Summer-only students applying for entrance in either of the two summer sessions should visit the Office of Extended Studies website (https://oes.umd.edu/incoming-current-visiting-students/summer-session/) for more information.

The Admission Process

To be considered for admission to the Graduate School, each applicant must follow the Graduate School application procedures (http://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/). The process requires the following:

- Completion of the University of Maryland Graduate Application (online);
- Payment of the non-refundable application fee;
- Submission of all relevant transcripts and supplementary application materials;
- Fulfillment of all graduate program admissions requirements;
- Adherence to published application deadlines.

Admissions Records and Disposition

All records, including both standardized test scores and academic records from other institutions, become part of the official file and can neither be returned nor duplicated for any purpose. Students should retain an additional copy of their official credentials to keep in their possession for advisory purposes and for other personal requirements.

The admission credentials and the application data of applicants are retained from the date of receipt for 12 months only and then destroyed in the following cases:

1) Applicants who do not register for courses at the time for which they have been admitted;

2) Applicants whose applications have been disapproved;

3) Applicants who do not respond to graduate program requests for additional information; and

4) Applicants whose applications are not complete with respect to the inclusion of all transcripts or test results.

Admission to Degree Programs

Graduate students are admitted to a particular program for a specific degree objective (M.A., Ph.D., Ed.D, etc.). With the exception of established dual degree programs, joint-degree programs, and certificate programs, graduate students are permitted to matriculate into only one graduate degree program at a time. Graduate students are admitted to either full or conditional status as outlined below:

Full Graduate Student Status

Students may be admitted to full graduate status if they have submitted official documents indicating a completed baccalaureate degree from a regionally accredited institution or have earned a degree equivalent to a baccalaureate degree from another country, and are fully qualified in the judgment of the individual program and the Graduate School.

Conditional Graduate Student Status

Students may be admitted to conditional status if:

- The previous academic record is not outstanding; **or**
- The prerequisite coursework in the chosen field is insufficient; **or**
- The applicant has majored in another field with a creditable record but has not yet clearly demonstrated abilities in the proposed new field; **or**
- The applicant needs to fulfill an English remediation requirement; **or**
- The applicant has not provided official verification of information required by the graduate program or the Graduate School, such as the last semester's work or receipt of a degree.

  Official transcripts indicating receipt of the degree must be submitted before the end of the first term of enrollment (semester or 12-week term). Registration for a second term (semester or 12-week) will not be permitted unless these documents are received by the Graduate School.

Offer of Admission

All completed applications will be reviewed by the Graduate School and the graduate program to which the applicant applied. Applicants may receive correspondence from each of these offices requesting clarification or additional information or documents. Responses should be directed to the inquiring office directly.

Formal admission to The University of Maryland is offered only by the Graduate School. Applicants admitted to the Graduate School will receive a written offer of admission from the Dean of the Graduate School. To accept or decline the offer, applicants must notify the Graduate School by the first day of classes of the term (semester or 12-week term) for which the applicant was accepted or the offer becomes void. Immediately following written acceptance, applicants should contact the graduate program for registration information. Applicants are allowed a one-time only deferral of the admission of up to one year, subject to approval by the graduate program. Applicants who are unsuccessful in gaining admission to a graduate program are also notified in writing by the Graduate School.

Admission Term Changes

The Offer of Admission is extended to the applicant only for a specified term (semester or 12-week term). If an admitted student or a Graduate Program wishes to change the term of entry (semester or 12-week term), they must petition the Graduate School in writing. The Graduate School will allow one (1) term (semester or 12-week term) change requested by the program, and one (1) requested by the admitted student, contingent upon the approval of the program's Director of Graduate Studies. Any further changes will require a new application to the Graduate School.

Non-Degree Admission: Non-Degree Seeking Student Status

Although the primary mission of the Graduate School is to conduct programs of graduate instruction leading to advanced degrees, the Graduate Faculty will admit qualified students without degree objectives as Non-Degree Seeking Students, to the extent that resources allow. Unofficial transcripts or photocopies of diplomas will be accepted with the application for evaluation purposes, but the student must submit official copies of all required documents before the end of the first term of enrollment (semester or 12-week term). Official transcripts must be submitted from all institutions except the University of Maryland, College Park.

The Non-Degree Seeking Student status is not available to international students who would require the University of Maryland to sponsor them on an F-1 student visa.

Applicants for admission to Non-Degree Seeking Student status must hold a baccalaureate degree from a regionally accredited institution, with a cumulative 3.0 grade point average, and:

- Submit official transcripts covering all credits used in satisfying the baccalaureate degree requirements, **or**
- If the applicant holds a master's or doctoral degree from a regionally accredited institution, submit an official transcript showing the award of a master's or doctoral degree, **or**
- Achieve a score that places the applicant in the upper 50th percentile of appropriate national standardized aptitude examinations, including the Graduate Record Examination, the Miller Analogies Test, and the Graduate Management Admissions Test (where different percentiles are possible, the Graduate School will determine which score is acceptable), **or**
- Provide a strong letter of support from the Graduate Director of the program in which the applicant plans to take a course.

Admission to Non-Degree Seeking Student status will continue for five years. If there is no registration in two consecutive academic terms (semesters -Fall and Spring or 12-week term), the admitted status will lapse and a new application will be required.

Non-Degree Seeking Students must maintain a 3.0 grade point average. Non-Degree Seeking Students whose grade point average falls below 3.0 will not be permitted to register. Non-Degree Seeking Students must pay all standard graduate fees. Students in this status are not eligible to hold appointments as Graduate Teaching or Research Assistants or Fellows, or to receive other forms of financial aid. All other services available to them (e.g., parking, library privileges) are the same as those accorded to other graduate students.

Successful completion of courses taken as a Non-Degree Seeking Student does not guarantee admission to a graduate degree or certificate program. Each program may accept such courses in satisfaction of program requirements to a maximum of nine (9) credits, contingent on admission to the degree or certificate program and on the approval of the faculty in the program. For consideration of admission to a degree program at a later time, the student must submit a new application. (For those admitted as an Advanced Special Student prior to the Fall 2017 term, each program may accept such courses in satisfaction of program requirements to a maximum of twelve (12) credits, contingent on admission to the degree or certificate program and on the approval of the faculty in the program.)

Visiting Graduate Student Status

A graduate student matriculated in another graduate school who wishes to enroll in the Graduate School of the University of Maryland and who intends to return to the graduate school in which he or she is matriculated, may be admitted as a Visiting Graduate Student.

To apply, the applicant must submit a completed application (http://gradschool.umd.edu/admissions/application-process/step-step-guide-applying/) and pay the current application fee. Transcripts, letters of recommendation, and test scores are not required. In lieu of transcripts, the applicant must submit a letter from the Graduate Dean at the applicant's institution confirming that the applicant is in good academic standing and that courses taken at the University of Maryland will be transferred to the home institution.

Golden Identification Card for Senior Citizens of Maryland

The University's services and courses are available without charge to citizens who are residents of the State of Maryland, 60 years of age or older, and retired (retired persons will be considered those who affirm that they are not engaged in gainful employment for more than 20 hours per week). Individuals who meet these requirements may apply for graduate admission, either as degree-seeking or non-degree-seeking students, and must meet all admissions criteria. Once admitted and issued the Golden Identification Card, senior citizens may register for courses in any session on a space-available basis, and may use the library and other University facilities during the time they are enrolled in courses. Tuition will be waived for Golden Identification Card holders, but mandatory fees must be paid. Golden ID Card holders may register during the first week of classes for up to 3 courses; they may not pre-register. Please refer to the *Registration Guide* for more information on the Golden ID registration procedures.

Change of Status or Program

Students are admitted with a particular status to a specified program for a specified objective. If a student wishes to change to a different program within the same school or college and the degree objective will remain the same or will change to a lower-level objective (e.g., PhD to M.A.), a Program/Degree Objective Change Form (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Forms/umd_grad_school_program-degree_objective_change_may_2021.pdf) may be submitted to the Graduate School. This form may also be used if a student wants to remain in the same program, but change to a lower-level degree objective.

A new application will be required if:

- The student wishes to change a program outside of their current school or college (students may be admitted to only one graduate program at any one time); or
- The student wishes to change status (from non-degree to degree); or
- The student wishes to pursue a higher-level degree objective (e.g., change from master's to doctoral degree).

Programs may request an exception to these rules. For example, a college or department may wish to allow students in a particular master's of professional studies program to be eligible to change their degree objective to a particular master's program without requiring a new application.

Admission to a new program and/or status is not granted automatically. Each application is reviewed and must meet the following criteria:

- Eligible students can submit a petition during any term, but can only petition to change their program and/or degree objective once during their University of Maryland graduate school career. Any subsequent requests to change a program and/or degree objective will require a new application and will be handled through the normal admissions process.
- To submit a petition, eligible students must have a GPA of 3.0 or higher or obtain Graduate School approval to waive this requirement. The process to waive this requirement is detailed in the petition process below.
- If a student changes their program and/or degree objective, they are responsible for adhering to the policies of their new degree program. Students should be aware that a change in program and/or degree objective may result in a change in, or loss of, fellowship and/or assistantship funding.

Petition Process
To submit a petition, students will:

- Secure permission for the program and/or degree objective change from the requested program. Each program designs their own review process and approval criteria, which is applied to all students who wish to change their program and/or degree objective. Each program must provide a path for students to change their degree objective from a higher to a lower level within the same program if such a master's degree exists (e.g., a doctoral student has met the degree requirements for a master's degree in the same program and desires to exit with the master's degree). Each program must also provide reasonable options to meet any remaining master's degree requirements within one year after the student elects to change their degree objective to a lower level within the same graduate program.
- Submit a petition for a change of program or change of degree objective to the Graduate School. The petition asks students to identify: (a) their current graduate program and degree objective, (b) the new graduate program, if different from the current program, and (c) their new degree objective. In some cases, graduate students may change their degree objective within the same program (e.g., change from a doctoral degree objective to a master's degree objective).
- Before submitting the petition to the Graduate School, students must obtain approval and signatures from the Director of Graduate Studies of their current program and their new program, if different from the current program.
- Once the program/degree objective is changed, the new Director of Graduate Studies will submit any/all relevant inclusion of credit requests, including any/all relevant course conversions (e.g., 899 to 799).
- International students on F-1/J-1 status must meet with the International Student & Scholar Services (ISSS) and obtain approval for the requested change via a signature on the petition.
- For students with a GPA of 3.0 or lower, the Director of Graduate Studies must submit a letter to the Graduate School to justify why the petition should be approved. The letter must include a plan for meeting the University's graduation requirement of a 3.0 or higher for all graduate students.

Deadlines

- Students must submit a completed petition to the Graduate School prior to the last day of final exams. Petitions for changes in program and/or degree objective received after final exams will be considered for the following term. A student must be enrolled during the term in which a degree is conferred, per the continuous registration requirement (https://academiccatalog.umd.edu/graduate/policies/registration-policies/#:~:text=repeatable%20for%20credit-,Continuous%20Registration%20Requirements,until%20the%20degree%20is%20awarded).
- For approved petitions, the student's Graduate School program termination date will be reset for those that change programs. For approved petitions for students who change a degree objective within the same program, the termination date does not restart. Program termination dates are separate from the termination dates for other requirements such as for the I-20 or for fellowship funding.

Admission of Members of the Faculty

No member of the faculty who is employed by the University of Maryland with the position of assistant professor or higher is permitted to enroll in a program leading to an advanced degree in his or her academic college or school. A faculty member who wishes to take course work for personal enrichment in his or her academic college or school may choose to investigate the Non-Degree Seeking Student status. A faculty member who wishes to pursue an advanced degree in a graduate program outside his or her academic college or school may do so by obtaining written consent from the Deans of both the academic college/school in which he or she is employed and that from which he or she seeks a degree, and, subsequently, from the Dean of the Graduate School.

Admission to An Institute

Application for admission to an institute should be made directly to the director of the institute. If admission to the Graduate School is also necessary, the decision will be based on the same criteria for admitting other degree applicants. Admission to an institute does not imply that the individual will be automatically admitted in any other status at the University of Maryland at a later date. The status terminates upon completion of the institute in which the student is enrolled. A new application and fee must be submitted for admission to any other graduate status or program.

Students already admitted to a regular graduate degree or non-degree status may also qualify for participation in an institute.

Immunization

The University of Maryland requires all freshmen, new graduate students, and transfer students to provide documentation of measles, mumps, rubella, and tetanus / diphtheria immunizations. It is a student's responsibility to provide this information to the Health Center before school begins. This requirement will not be waived.

Residency Classification

Petitions, related documents and questions concerning the Board of Regents Policy on Student Classification for Admission and Tuition Purposes should be directed to the Residency Reclassification Services (http://www.registrar.umd.edu/resreclass.html) in the Office of the Registrar.

Determination of In-State Status for Admission and Tuition Purposes: See www.usmh.usmd.edu/regents/bylaws/SectionVIII/VIII270.html **(**http://www.usmh.usmd.edu/regents/bylaws/SectionVIII/VIII270.html**) for the complete text of this policy.**

An initial determination of in-state status will be made by the Graduate School at the time a students' application for admission is considered. The determination made at that time, and any determination made thereafter, shall prevail in each term (semester or 12-week term) until the determination is successfully challenged. Students may challenge their classification by submitting a timely petition to the Residency Reclassification Services. Determinations are based on the residency policy and requirements. The deadline for submitting a complete petition along with all supporting documents, is the first day of the term (semester or 12-week) in which the student wishes to be classified as in-state.

The volume of requests for reclassification may necessitate a delay in completing the review process. A decision in each case will be made within 60 days of receipt of a complete petition and all required

documentation. During this period of time, or any further period of time required by the university, any fees and charges based on the previous determination must be paid. The student is solely responsible for any late charges incurred by the residency process. If the determination is changed, any excess fees and charges will be refunded.

Students classified as in-state for admission and tuition purposes are responsible for notifying the Residency Reclassification Services in writing within 15 days of any change in their circumstances that might in any way affect their classification at the University of Maryland.

For more information, refer to the Residency Classification Services (http://www.registrar.umd.edu/resreclass.html) web page.

Registration Policies

Registration and Credit Information

To attend classes at the University of Maryland, College Park, it is necessary to process an official registration. Specific registration dates and instructions are available at registrar.umd.edu (http://registrar.umd.edu/current/). Registration information for Summer Session, Winter Session, and Professional Graduate Programs administered by the Office of Extended Studies may be found at oes.umd.edu (http://www.oes.umd.edu/).

The University of Maryland has adopted email as the primary means for sending official communications to students. Academic advisors, faculty, and campus administrative offices use email to convey important information and time-sensitive notices. All enrolled students are provided a university email address. Students are responsible for keeping their email address up to date or for forwarding email to another address. Changes of email address and other contact information can be completed online at registrar.umd.edu/current/index.html#online-transactions (http://registrar.umd.edu/current/#online-transactions).

Health Insurance for Graduate Students

Health insurance is important for maintaining physical and mental well-being while in graduate school. Unexpected healthcare expenses can be disruptive to students' academic progress. Beginning with the Fall 2020 semester, all students enrolled full-time in a master's or doctoral program at the College Park campus must have health insurance coverage. Full-time students are those who are enrolled for at least 48 units for the semester or 36 units for a 12-week term. Part-time students, non-degree-seeking students, and students enrolled in certificate programs, exclusively on-line programs, and/or programs at the Shady Grove campus are encouraged but not required to have health insurance, unless required by immigration status.

Students holding a graduate assistantship can choose to 1) enroll in a Maryland State Employee Health Insurance Plan, 2) enroll in the University's Student Health Insurance Plan (SHIP), or 3) enroll in an external plan.

Students not holding a graduate assistantship can choose to 1) enroll in the University's Student Health Insurance Plan (SHIP) or 2) enroll in an external plan.

Students who enroll in an external plan, including under someone else's plan (a parent or a spouse), will be asked to provide insurance information to the Graduate School.

Information about the Maryland State Employee medical, prescription drug, and dental plans available to graduate assistants can be found at uhr.umd.edu/benefits/medical-insurance (https://uhr.umd.edu/benefits/medical-insurance/). Information about the Student Health Insurance Plan (SHIP) available to all students can be found at umd.myahpcare.com (https://umd.myahpcare.com/). More information and resources about health insurance are available on the Graduate School Health Insurance webpage at gradschool.umd.edu/health-insurance (https://gradschool.umd.edu/health-insurance/).

Designation of Full-Time and Part-Time Status

The Graduate School uses a unit system in making calculations to determine full-time or part-time student status. Please note that graduate units are different from credit hours. The number of graduate units per credit hour is calculated in the following manner:

- Courses in the series: 400-499 carry 4 units per credit hour.
- Courses in the series: 600-897 carry 6 units per credit hour.
- Master's Research course: 799 carries 12 units per credit hour.
- HESP829 (https://academiccatalog.umd.edu/search/?P=HESP829) course carries 18 units per credit hour.
- Pre-candidacy Doctoral Research courses: 898 carries 18 units per credit hour.
- Doctoral Dissertation Research: 899 carries 18 units per credit hour. All doctoral candidates must pay candidacy tuition for which they will be registered for six (6) credit hours of 899; this defines all currently registered doctoral candidates as full-time.

For programs on the semester term, to be certified as full-time, a graduate student must be officially registered for a combination of courses equivalent to 48 units per semester. Graduate assistants holding regular (20 hour per week) assistantships must be registered for at least 24 units in addition to the assistantship; holders of half (10 hour per week) assistantships must be registered for at least 36 units. Audited courses do not generate graduate units and cannot be used in calculating full-time or part-time status.

For programs on the 12-week term, to be certified as full-time, a graduate student must be officially registered for a combination of courses equivalent to 36 units per 12-week term. Graduate assistants holding regular appointments must be registered for at least 18 units in addition to the assistantship; holders of half-time assistantships must be registered for at least 27 units. Audited courses do not generate graduate units and cannot be used in calculating full-time or part-time status.

Course Numbering System

Courses are designated as follows:

- 000-099: Non-credit courses
- 100-199: Primarily first-year courses (not acceptable for credit toward graduate degrees).
- 200-299: Primarily sophomore courses (not acceptable for credit toward graduate degrees).
- 300-399: Junior and senior courses (not acceptable for credit toward graduate degrees).
- 400-499: Junior and senior courses acceptable for credit toward some graduate degrees. The number of such credits is limited by policies of the Graduate School and by the graduate program.

- 500-599: Professional school courses (Dentistry, Law, Medicine) and post-baccalaureate courses not for graduate degree credit.
- 600-898: Courses restricted to graduate students (see above for exceptions).
- 799: Master's thesis credit.
- 899: Doctoral dissertation credit.

The first character of the numeric position of the course number determines the level of the course and the last two digits are used for course identification. Courses ending with the numeral 8 or 9 are the only courses that are repeatable for credit.

Continuous Registration Requirements

All graduate students must register for courses and pay associated tuition and fees each term (semester or 12-week term), not including summer and winter sessions for semester-based programs, until the degree is awarded. During the term that they graduate, all graduate students must be registered for a minimum of one credit at the University of Maryland, either on the College Park campus or at an approved University of Maryland instructional site.

A student who fails to register and who has not requested and received a waiver of registration or "Leave of Absence for Childbearing, Adoption, Illness or Dependent Care" will be notified by the Graduate School after the first day of classes that they must register for the current term (semester or 12-week term). The Graduate School will also inform the Graduate Director of the graduate program that the student is in jeopardy of termination. If the student does not register, they will be dismissed from the Graduate School at the end of the term (semester or 12-week term) for failure to comply with the continuous registration requirement.

A student who is dismissed for non-registration may appeal dismissal during a 30-day period following the end of the semester or during a 10-day period following the end of a 12-week term of non-registration. If the student does not appeal, or if the appeal is denied, and the student wishes to continue in the Graduate School, the student must apply for readmission. In this case, readmission does not alter the initial requirements for time to complete the degree or advance to candidacy.

Waiver of Registration for Certificate, Master's, and Pre-Candidacy Doctoral Students

Certificate, Master's, and pre-candidacy Doctoral students who will be away from the University for a term (semester or 12-week term) or for two terms (a year on the semester system or two 12-week terms) may request a waiver of continuous registration and its associated tuition for the term(s) granted. Waivers of registration will be granted only if the student is making satisfactory progress toward the degree and can complete the degree requirements within the required time limits. Interruption of registration cannot be used to justify a time extension.

Permission for non-registration is obtained from the Graduate Director of the student's program and the waiver must be filed with the Graduate School. Students who are not registered may not use any University facilities, including the library, and should expect to consult with members of the Graduate Faculty seldom or not at all.

A request for a waiver of registration should be filed 30 days before the beginning of the term (semester or 12-week term) for which the waiver is sought. Tuition waiver requests will be granted only when the student affirms in writing that they will not be using any University resources, including the time of faculty members, during the waiver period.

Waiver of Registration for Doctoral Candidates

Doctoral Candidates are not eligible for Waivers of Continuous Registration. Each doctoral Candidate must maintain continuous registration in 899 (Doctoral Dissertation Research) until the degree is awarded. Waivers of Registration may be granted only under the University's policy for Leave of Absence for Graduate Students for Childbearing, Adoption, Illness or Dependent Care (see below).

Waiver of Mandatory Fees

A waiver of Mandatory Fees may be granted to any graduate student, including Doctoral Candidates, if the registered student will be away from the College Park campus for an entire term (semester or 12-week) exclusively for the purpose of thesis or dissertation research (799, 898, or 899) or a required full-time professional experience (e.g., an internship, apprenticeship, or practicum). To qualify, the off-campus research or professional experience must be at least 50 miles from the College Park campus. Students who are off campus for other reasons (e.g., taking all online courses) are not eligible for this waiver. An application for a Waiver of Mandatory Fees (https://gradschool.umd.edu/forms/) must be submitted to the Graduate School. Students are not eligible for a Waiver of Mandatory Fees for the term in which they complete their degree requirements. More information on Mandatory Fees can be found here (https://billpay.umd.edu/GraduateTuition/).

Leave of Absence for Childbearing, Adoption, Serious Health Condition, Dependent Care, or Financial Hardship

In recognition of the effects that childbirth, adoption, serious health condition (mental and/or physical), caring for incapacitated dependents (such as children, ill or injured partners, or aging parents), and situations that present financial hardship may have on the time and capacity that graduate students have to devote to their educational programs, the University allows students in such circumstances to apply for a leave of absence of up to two semesters or up to three 12-week terms during which time they do not intend to make academic progress toward the completion of their degree. The time taken on an approved leave of absence is not included in the time limitations for degree completion and advancement to candidacy. For the Graduate Student Parental Accommodation Policy, which provides students the option to maintain full-time enrollment status rather than take a leave of absence, see the Parental Accommodation Policy. (https://academiccatalog.umd.edu/graduate/policies/academic-record/#parental-accommodation)

LENGTH OF LEAVES

Application for a leave of absence may be made either on a one- or two-semester basis or on one- or two- or three 12-week term basis. A leave of absence ordinarily will not be granted for more than one academic year. Leaves requested for a longer period are approved only in exceptional circumstances; if the absence exceeds a total of two years, the student should withdraw from the program and reapply when capable of returning to active graduate study. An approved leave for one semester will be extended to two semesters as needed or an approved leave for one 12-week term will be extended to two and will be extended to three, if so

requested by the applicant prior to the expiration of the approved one-term (semester or 12-week) leave of absence.

APPLICATION PROCEDURES

A leave of absence normally must be requested and approved prior to the beginning of the academic term for which it is being requested. If a leave of absence is submitted during a term, the policies for Withdrawal from Classes and Grading Systems (i.e., assigning a grade of “incomplete”) apply. The Petition for a Waiver of Regulation can be employed after the add/drop period for approved leave of absences. A leave of absence cannot be requested retroactively after a term ends (i.e., the last day of classes in a semester).

The student can request the Leave of Absence by completing and submitting the Leave of Absence Request Form (https://gradschool.umd.edu/forms/). Requests for medical leaves of absences require a supplemental form to be completed by the student’s health care provider. The request must be approved by the student's faculty advisor and Graduate Director prior to submission to the Graduate Dean. Approved leaves will stop the student's "time-to-degree clock." At the end of the leave of absence, the student must complete and submit the Return from Leave of Absence Form prior to the beginning of the term the student intends to return to active study. Students who were on a Leave of Absence for medical reasons will be required to submit a supplemental form completed by the student’s health care provider. Students will not be eligible to register until they have requested to return from their leave of absence.

SPECIAL CONSIDERATIONS

- **Registration Requirements.** Students on approved leaves of absence are not registered at the University and, therefore, do not have the rights and privileges of registered students. Students must be registered during a term (semester or 12-week) in which they fulfill a University or departmental degree requirement, such as taking qualifying exams or submitting a dissertation/thesis. In addition, students must also be registered in order to be eligible for any form of University financial aid (e.g., a teaching or research assistantship) and to be certified as full-time students.

- **Impact on Funding.** When contemplating a leave of absence, graduate students are advised to consult with the sources of their funding to determine whether a leave might involve a long-term financial loss. Because academic programs and financial aid packages may be constructed and sequenced over a period of years, individual interruptions to the normal sequence of academic progress and scheduled employment may result in a loss of future funding and a slower time to completion of degree. In some programs, a leave of absence may mean that students may have to join a new project upon return, with the likelihood that their research may take longer to complete. Whenever a leave of absence is being considered, a student should meet with the advisor to develop a plan for resumption of study and gain a clear understanding of future funding opportunities. Some outside funding agencies frown on interruptions to a degree program. Some only allow leaves for medical reasons or military service. Others require prior approval of the fellowship agency.

- **Students with outstanding educational loans** need to consider the effect of taking a leave of absence on their loan status. For some student loans, a grace period for repaying the loan begins once the student stops registering. If the leave period is longer than the grace period, then the student may have to begin repaying the loan while on a leave of absence. Prior to taking a leave, students should arrange to meet with a Student Financial Aid officer, and/or contact their lenders.

- **International students.** Non-immigrant F-1 and J-1 students and their dependents must maintain legal immigration status at all times. Students with F-1 or J-1 visas must be enrolled full-time every term (semester or 12-week) at the University while they remain in the United States. The only possible exception that might allow a student to remain in the United States while on an approved leave of absence might be a serious illness or medical condition. Students are advised to consult with International Student and Scholar Services (http://international.umd.edu/ies/97/)for more information when considering a leave of absence.

- **Student Accounts.** Students are advised to check with Student Financial Services and Cashiering (https://billpay.umd.edu/) prior to taking an approved leave of absence in order to determine the status of their student accounts. Students are advised that accounts that are overdue will be subject to regular procedures in accordance with University guidelines, notwithstanding any approved leave of absence: specifically, late fees and finance charges will continue to accrue, students will be blocked from future registration upon their return, and accounts will be referred to the State Central Collection Unit, with the imposition of additional collection charges, for non-payment in accordance with regular time frames.

- **University Housing.** The University's general policy is that students must be registered to be eligible for University housing. For specific information about continued eligibility for University housing during an approved leave of absence, students are advised to contact the Department of Resident Life. Additional restrictions may apply to students leasing housing through Southern Management Corporation or other third-party entity. For specific information, students should contact the appropriate rental agent.

- **Access to University Resources.** Students who are on a leave of absence do not have a valid University of Maryland Identification card and therefore are not entitled to use University resources, such as the libraries, recreational centers, shuttle buses, and other services covered by mandatory fees. Students seeking information on the use of the libraries may check lib.umd.edu/access/access-privileges (http://www.lib.umd.edu/access/access-privileges/), or contact the McKeldin Library Circulation Department, Community Borrowers Office, Monday-Friday, 9:00 a.m. - 4:00 p.m.

Leave of Absence for Military Service

Graduate students in the United States Armed Forces, including members of the National Guard or Reserve, may apply for a leave of absence to fulfill a voluntary or involuntary service commitment. Students may apply for a leave of absence of up to two semesters, during which time the requirement of continuous graduate registration is suspended.

LENGTH OF LEAVES

Application for a leave of absence may be made for one or two semesters. An approved leave for one semester may be extended to two semesters if requested by the applicant at least four weeks prior to the expiration of the approved one-semester leave of absence. Leaves of absence for more than two semesters will be considered on a case by case basis for the duration of the military service.

APPLICATION PROCEDURES

A leave of absence for military service (https://gradschool.umd.edu/forms/) must be requested and approved prior to the beginning of the academic term for which it is being requested. The student can request the Leave of Absence by completing and submitting the Leave of Absence Form. The student must submit a copy of paperwork confirming induction or authorization for active duty, The request must be approved by the student's faculty advisor and Graduate Director prior to submission to the Graduate Dean. Approved leaves will stop the student's "time-to-degree clock." Students will not be eligible to register until they have requested to return from their leave of absence.

SPECIAL CONSIDERATIONS

- **Registration Requirements.** Students on approved leaves of absence are not registered at the University and, therefore, do not have the rights and privileges of registered students. Students must be registered during a term (semester or 12-week) in which they fulfill a University or departmental degree requirement, such as taking qualifying exams or submitting a dissertation/thesis. In addition, students must also be registered in order to be eligible for any form of University financial aid (e.g., a teaching or research assistantship) and to be certified as full-time students.

- **Impact on Funding.** When contemplating a leave of absence, graduate students are advised to consult with the sources of their funding to determine whether a leave might involve a long-term financial loss. Because academic programs and financial aid packages may be constructed and sequenced over a period of years, individual interruptions to the normal sequence of academic progress and scheduled employment may result in a loss of future funding and a slower time to completion of degree. In some programs, a leave of absence may mean that students may have to join a new project upon return, with the likelihood that their research may take longer to complete. Whenever a leave of absence is being considered, a student should meet with the advisor to develop a plan for resumption of study and gain a clear understanding of future funding opportunities. Some outside funding agencies frown on interruptions to a degree program. Some only allow leaves for medical reasons or military service. Others require prior approval of the fellowship agency.

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- **Student Accounts.** Students are advised to check with Student Financial Services and Cashiering (https://billpay.umd.edu/) prior to taking an approved leave of absence in order to determine the status of their student accounts. Students are advised that accounts that are overdue will be subject to regular procedures in accordance with University guidelines, notwithstanding any approved leave of absence: specifically, late fees and finance charges will continue to accrue, students will be blocked from future registration upon their return, and accounts will be referred to the State Central Collection Unit, with the imposition of additional collection charges, for non-payment in accordance with regular time frames.

- **University Housing.** The University's general policy is that students must be registered to be eligible for University housing. For specific information about continued eligibility for University housing during an approved leave of absence, students are advised to contact the Department of Resident Life. Additional restrictions may apply to students leasing housing through Southern Management Corporation or other third-party entity. For specific information, students should contact the appropriate rental agent.

- **Access to University Resources.** Students who are on a leave of absence do not have a valid University of Maryland Identification card and therefore are not entitled to use University resources, such as the libraries, recreational centers, shuttle buses, and other services covered by mandatory fees. Students seeking information on the use of the libraries may check lib.umd.edu/access/access-privileges (http://www.lib.umd.edu/access/access-privileges/), or contact the McKeldin Library Circulation Department, Community Borrowers Office, Monday-Friday, 9:00 a.m. - 4:00 p.m.

Academic Calendar

The academic calendar (https://www.provost.umd.edu/calendar/) contains important information regarding registration. Graduate students preparing to graduate should refer to the Deadlines for Graduate Students (http://registrar.umd.edu/calendar.html).

Course and Credit Changes

A graduate student may drop a course, add a course, change between audit and credit status, change the number of credits for a course within the listed range, cancel registration, or withdraw from the University without special approval until the end of Schedule Adjustment Period. No credit level changes or grading option changes are permitted after the "Graduate Student Deadline To" date. The deadlines (http://www.registrar.umd.edu/calendar.html) are published each term on the Registrar's website; the procedures governing each of these transactions are listed below. Drop/Add and other changes may be done in person at the Office of the Registrar or online at testudo.umd.edu (http://www.testudo.umd.edu). **Full refunds are not available for reductions in total credits after the first day of classes.** For more information, please see the Refunds section of this Catalog. (http://pdc-webapp-lamp27.umd.edu/Catalog/policy.php?tuition-and-fees)

Exceptions to the published deadlines require a petition to the Graduate School which must include the written approval of the instructor and the Graduate Director of the program. Petitions should be submitted to the Graduate School, 2123 Lee Building. The graduate program stamp must be placed on the change of grading option/credit level form.

Withdrawal From Classes

The term "withdrawal" means termination of enrollment in all classes for a given term (semester or 12-week). The date of the withdrawal is indicated on a graduate student's academic record. To withdraw from a term (semester or 12-week) on or before the last day of classes a graduate student must complete the Degree-Seeking Graduate Student Withdrawal form (https://www.registrar.umd.edu/petitions-forms/Degree-SeekingGraduateStudentWithdrawalForm.pdf) and submit to the Office of the Registrar, 1113 Mitchell Building, in person or by email at registrar-graduate@umd.edu. Withdrawal becomes effective on the date notification is received in the Records Office. The University Refund Policy applies to withdrawals after the first day of classes. Students who withdraw from classes must also submit a request

(https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Forms/petition_for_waiver_of_continuous_registration.pdf) for Waiver of Continuous Registration to the Graduate School at gradschool@umd.edu.

If the time limitation in a master's or pre-candidacy student's program has not lapsed (5 years to obtain a master's degree and 5 years to reach doctoral candidacy), the graduate student is eligible to re-enroll without readmission provided they have received a waiver of registration from the graduate program or have received an approved Leave of Absence from the Graduate School; withdrawal by a graduate student without an approved Leave of Absence or Waiver of Registration will officially end the student's status as a graduate student.

Resignation From the University

A graduate student wishing to withdraw from the University and terminate their graduate student standing may do so by submitting an email or letter to the Graduate School at gradschool@umd.edu. The email used must be the student's official University of Maryland email address. The Graduate School will then cancel the student's admission status, effective the date the letter is received. If the student is registered for classes at the time of their resignation, the student must complete the Degree-Seeking Graduate Student Withdrawal form (https://www.registrar.umd.edu/petitions-forms/Degree-SeekingGraduateStudentWithdrawalForm.pdf) and submit to the Office of the Registrar, 1113 Mitchell Building, either in person or by email at registrar-graduate@umd.edu. The University Refund Policy applies for resignation after the first day of classes. A graduate student seeking to return to the University of Maryland after resigning must reapply for admission and is subject to all graduate program and Graduate School requirements. They may be required to repeat previously taken courses (see time limits for relevant degree or certificate programs).

Grading Systems

The University's A through F grading system is used in graduate level courses. A "Satisfactory or Failure" (S-F) grading system may be used for certain types of graduate study at the discretion of the graduate program. These include courses that require independent fieldwork, special projects, or independent study. Graduate program seminars, workshops, and graduate program courses in instructional methods may also be appropriate for the S-F grading system. The "Pass-Fail" grading system is not available for graduate students. However, a graduate program may allow, in certain cases, a graduate student to use the Pass-Fail option for 100-300 level courses. Graduate credit may not be earned for these courses. Either the A-F or the S-F grading system may be used for pre-candidacy (898) and courses labeled "Independent Study" or "Special Problems." Only one grading system may be used per course in a particular term (semester or 12-week). The grading system will be designated by the student's graduate program or the graduate program offering the course.

The S-F grading system must be used for master's thesis (799) and doctoral dissertation (899) research. A grade of S indicates satisfactory progress towards the completion of the thesis or dissertation; a grade of F indicates failure to make satisfactory progress. A grade of F will trigger a review to determine whether the student's enrollment should be terminated. Determinations of satisfactory progress (p. 1024) occur at the graduate program level. A grade of I (incomplete) may be assigned if the advisor is unable to determine that the student is making satisfactory progress. The grade of I should be used sparingly and only after the advisor has spoken with the student about concerns regarding satisfactory progress. For 799 and 899 there are no incomplete contracts. Advisors should change grades of I to S when the student has demonstrated satisfactory progress, or to F if the advisor determines the student is incapable of making satisfactory progress. Upon successful completion of all degree requirements and the award of the degree, any remaining I grades for 799 and 899 will automatically be changed to S.

Graduate Credit for Undergraduates

An undergraduate degree-seeking student at the University of Maryland may register for graduate-level courses (600-897) with the approval of the Dean of his or her academic college, the chair of the department, the instructor offering the course, and the Dean of the Graduate School. These courses will be recorded as "for graduate credit only" and may ONLY be applied toward an advanced degree at this university or elsewhere. Students eligible for this option must have achieved Junior standing, will have a GPA of at least 3.0, and will have successfully completed the prerequisite courses with a grade of "B-" or better.

The student must submit a plan of study showing that taking graduate courses will not unduly delay completion of the requirements for the bachelor's degree. The total of graduate and undergraduate credits attempted in any semester may not be more than 18. The graduate credits so earned will not count toward any requirements for the bachelor's degree. An undergraduate student may take a maximum of nine graduate credits when taken as graduate credits only. Programs can petition the Dean of the Graduate School to request up to 12 graduate credits for undergraduates, such as for combined bachelor's-master's programs. Courses in a 12-week term program are not open to undergraduate students. In order to earn a graduate degree or certificate, students must be admitted into the Graduate School. Please see the combined bachelor's-master's policy for credit limits that pertain to those programs.

Undergraduate Credit for Graduate Courses

Subject to requirements determined by the Graduate Faculty of the department or program offering the course, undergraduate degree-seeking students may register for graduate-level courses, (those numbered from 600 to 897) with the exception of 799, for undergraduate credit. The student must obtain the prior approval of the department and instructor offering the course.

Enrollment in a graduate-level course does not in any way imply subsequent departmental or Graduate School approval for admission into a graduate program. The course may not be used as credit for a graduate degree at the University of Maryland except as part of an approved Bachelor's/Master's program into which the student has been admitted. Courses in 12-week programs are not open to undergraduate students.

Partial Credit for Students With Disabilities

The Graduate School recognizes that students with documented disabilities may be prevented from participating courses that include laboratories, studio work, or other non- classroom activities in which the student is prevented from participating because of the disability. Therefore, it is the Graduate School 's policy to allow students with disabilities to enroll in such courses, complete only those parts of the course that their capabilities permit, and receive credit for the course proportionate to their levels of participation. Students with disabilities should contact Disability Support Services (DSS) for information and assistance with any disability-related issue. Phone (301) 314-7682 (V/

TTY). Graduate students with disabilities who wish to enroll under this policy should consult the Graduate School. The Dean, in consultation with DSS, will assist the student in making the necessary arrangements with the graduate program offering the course, the graduate program in which the student is enrolled, and the Office of Registrar. The final agreement as to the student's level of participation and the amount of credit to be awarded will be specified in an agreement to be drawn up by the Dean of the Graduate School and signed by all parties concerned.

Inter-Institutional Registration, University System of Maryland

A student admitted to the Graduate School in any institution of the University System of Maryland is eligible to take courses at any other institution of the University System of Maryland subject to the approval of the Graduate Directors and the Graduate Deans of the home and host institutions. Credits earned at a host institution are considered resident credit at the home institution, and, following normal procedures for graduate program approval, these credits may be used to meet University of Maryland graduation requirements. Transcripts of courses taken at another institution will be maintained at the home institution and fees will be paid to the home institution. Forms for registration as an inter-institutional student may be obtained from the Office of the Registrar. For more information, refer to Inter-Institutional Enrollment (http://www.registrar.umd.edu/current/registration/inter-institutional.html).

The Washington Consortium Arrangement

The University of Maryland is a member of the Consortium of Universities of the Washington Metropolitan Area (http://www.consortium.org/). Other institutions currently associated with the consortium include American University, The Catholic University of America, the University of the District of Columbia, Gallaudet University, George Mason University, Georgetown University, George Washington University, Howard University, Marymount University, Trinity University, the National Defense University, The Joint Military Intelligence College, and Southeastern University. Students enrolled in any one of these institutions are able to attend certain classes at the other institutions and have the credit considered "residence" credits at their own institutions. Grades in these courses are calculated into the student's GPA. Tuition remission awarded to graduate assistants and fellows may be used to pay for courses at other consortium universities. Students from schools in the Consortium of Universities of the Washington Metropolitan Area may register for University of Maryland courses on a space-available basis beginning with the first day of classes.

The policies governing registration through the Consortium Arrangement are listed below.

- Courses for majors in graduate programs at the University of Maryland that have restricted enrollment will not be available to students from other consortium schools. Similar rules may apply at other consortium universities.
- Students from consortium schools are expected to meet all prerequisites for University of Maryland courses for which they wish to enroll. Similar rules may apply at other consortium universities.
- Students from consortium schools will not be permitted to register for practica, workshops, internships, and other experiential courses at the University of Maryland . Similar rules may apply at other consortium universities.
- Students from consortium schools who have previously applied for admission to a University of Maryland graduate degree program and have been denied admission will be permitted to register for graduate courses in that program only with the specific approval of the Director of Graduate Studies of the program.
- Students from consortium schools who have been dismissed from the University of Maryland for disciplinary or financial reasons will not be permitted to enroll in courses at the University of Maryland under the consortium arrangement.
- Graduate assistants and fellows can use tuition remission provided by the University of Maryland to pay for courses at other consortium universities.

For more information, refer to the D.C. Consortium Enrollment (http://www.registrar.umd.edu/current/registration/consortium.html).

Tuition, Fees, and Expenses

Payment of Tuition and Fees

Tuition rates and fees are posted on the University's website (https://billpay.umd.edu/GraduateTuition/).

Tuition, fees, and other University charges may be paid by mail, online (https://billpay.umd.edu/payments/payment-overview/) or in person at 1135 Lee Building, 8:30 a.m.- 4:30 p.m., Monday through Friday. The University accepts checks (no fee) and Visa, MasterCard, American Express, and Discover cards for payment. Checks should be made payable to "The University of Maryland." Students can also obtain their account balances through Student (https://billpay.umd.edu/)Financial Services and Cashiering (https://billpay.umd.edu/).

It is the policy of the University not to allow deferment of payment pending the result of an application for financial assistance to an outside agency, including Veterans Administration benefits, bank loans, or guaranteed student loan programs.

Each student is individually responsible for his or her bill and for meeting payment deadlines. Failure to meet these deadlines may result in late charges or cancellation of registration. The University will suspend services to students for delinquent indebtedness and failure to pay bills. The University will also transfer delinquent accounts to the State Central Collections Unit, which will levy further late fees and take necessary steps to obtain payment.

Forms of Financial Aid

The Office of Student Financial Aid administers a number of programs to assist graduate students (e.g. loans and federal work study). Please visit the Office of Student Financial Aid (https://financialaid.umd.edu/) for more information.

Emergency Loans

Students may receive up to $500 as an interest-free loan that must be repaid in 60 days. If the loan is not repaid within 60 days, the amount will be charged against the student's account and late fees may be incurred. These loans are available from the Office of Student Financial Aid, 1135 Lee Building . Applicants should bring documentation of their need. They will then be asked to complete a short loan application form. They will subsequently meet briefly with a loan counselor who will review their need. The loan counselor will either approve or deny funds.

University Refund Statement

Tuition, fees, and refundable deposits are authorized for refund only if the student completes the prescribed withdrawal procedures or is dismissed from the University. Residence Hall and Dining Services charges are authorized for refund only if the student completes the prescribed residence hall and dining services contract release procedures. Please refer to the current Academic Deadlines (http://www.registrar.umd.edu/calendar.html) for complete refund information and procedures.

Refunds for Withdrawal from All Classes

A Cancellation of Registration submitted to the Office of the Registrar **before** the first day of classes entitles the student to a full credit or refund of term (semester or 12-week) tuition and fees.

After classes begin, students who wish to terminate their registration and withdraw from all classes must follow the withdrawal procedures specified in the Registration Guide (http://www.registrar.umd.edu/reg_guides.html). Students will find the necessary forms for withdrawal by visiting the Office of the Registrar, online (https://registrar.umd.edu/current/registration/withdrawgrad.html) or in person at 1113 Clarence M. Mitchell Jr. Building. The effective date used in computing refunds is the date the withdrawal form is filed with the Office of the Registrar. Stopping payment on a check, failure to pay the term (semester or 12-week) bill, or failure to attend classes does not constitute withdrawal.

Students withdrawing from the University will be credited for tuition in accordance with the following schedule:

Period from data instruction begins	Refundable tuition*
Two weeks or less	80%
Two to three weeks	60%
Three to four weeks	40%
Four to five weeks	20%
Over five weeks	no refund

[1] Fees are non-refundable after the first day of classes.

Withdrawal from all classes may be a violation of the Graduate School's Continuous Registration policy. Students withdrawing from classes who intend to continue in their graduate degree or certificate program should secure a Waiver of Continuous Registration or Leave of Absence from the Graduate School before withdrawing.

Refunds for Dropping Individual Courses

Graduate students may obtain refunds for courses that are dropped during the Schedule Adjustment Period. Students may drop and add courses without penalty provided that the changes are made on the same day and that the total number of credits does not change. Graduate students are charged by the credit hour. A percentage charge and/or complete charge will be imposed according to the schedule below:

Withdrawal	Refund
Prior to the first day of classes - no charge	100% refund
During the Schedule Adjustment Period - 20% charge	80% refund
After the Schedule Adjustment Period - 100% charge	0% refund

For funds to be returned, students must file a request for a refund with Student Financial Services and Cashiering. If a request for refund is not filed, credit on the student account will automatically be carried over to the next term (semester or 12-week). Refund requests may be made by addressing a letter to Student Financial Services and Cashiering, Lee Building, University of Maryland, College Park, 20742, visiting the Student Financial Service Center, Lee Building, Room 1135, between 8:30 am to 4:30 pm, Monday-Friday, or requesting a refund online through Student Financial Services and Cashiering. (https://billpay.umd.edu/) A credit balance is not automatically refunded. More information can be found at billpay.umd.edu/refunds (https://billpay.umd.edu/refunds/).

Fellowships, Assistantships, and Financial Assistance

The University of Maryland recognizes the high cost of education today and makes every effort to offer financial assistance to qualified students through a variety of programs. Approximately seventy percent (70%) of all full-time graduate students receive financial support, which may include remission of tuition, teaching and research assistantships, work-study support, and University and other fellowships. Referrals for University or area employment opportunities for students and students' spouses are also available in various graduate programs and in specific student service centers at the University.

Admission to a graduate degree program is a prerequisite for the award of a teaching or research assistantship, a fellowship, a traineeship, a loan, or a work-study award.

Graduate Fellowships

Graduate Fellowships are funded by the Graduate School through grants allocated to the academic colleges specifically for this purpose. Applicants and current students must apply directly to their Graduate Programs for fellowship funding. The Graduate School offers a limited number of dissertation fellowships. Applications are solicited annually. More information may be obtained from the Graduate School's fellowship website (http://gradschool.umd.edu/funding/fellowship-information/) as well as the Fellowships (http://pdc-webapp-lamp27.umd.edu/Catalog/policy.php?fellowships-policies)chapter of this Catalog.

Graduate Assistantships

A graduate assistantship is an academic appointment not involving academic tenure. Such assistantships take the form of teachings assistantships, research assistantships or, in a few cases, administrative assistantships. Offers of these positions are made to graduate students directly by the programs and departments.

The assigned duties of a graduate assistant are consistent with the aims and objectives of the teaching and research missions of the University. An appointment of 20 hours per week is considered a full-time assistantship. An appointment of 10 hours per week is considered a half-time assistantship. The responsibilities assigned to a graduate assistant should take into account what may be reasonably expected given the graduate assistant's education and experience.

For more information, please see the Assistantships (http://pdc-webapp-lamp27.umd.edu/Catalog/policy.php?assistantship-policies) chapter of this Catalog.

Overload Payments for Graduate Students

Under certain circumstances, fellows and graduate assistants may be offered employment in addition to their normal appointments. As outlined in Chapter 15: Graduate Assistants and Chapter 16: Graduate Fellows , approval for such overload payments must be obtained from the Graduate School in advance of the appointment. The required request form can be found at gradschool.umd.edu/forms (http://gradschool.umd.edu/forms/).

Travel Grants

The Graduate School administers the Jacob K. Goldhaber travel grants for graduate students. Goldhaber grants are available to support part of the cost of attending conferences at which graduate students will present the results of their research. Because funding is limited, students are urged to apply as soon as their presentations have been accepted. More information is available at gradschool.umd.edu/funding (https://gradschool.umd.edu/funding/).

Policies for Graduate Assistantships

General Policies

Graduate Assistants (GAs) are, first and foremost, graduate students pursuing an education. The opportunity to work closely with faculty members and undergraduate students in teaching, research, or administrative environments is an integral part of that education.

Graduate students who hold assistantships benefit educationally and professionally. They gain further expertise in their field; enhance their research skills and develop pedagogical skills; acquire experience in leadership, interpersonal effectiveness, and performance evaluation; acquire academic administrative experience; and enjoy collegial collaborations with advisors that may result in joint publications and other professional activities. Skills learned in assistantships prepare students not only for the academy, but also for corporate, government, and nonprofit organizations.

Assistantships also provide graduate students with the financial resources necessary to pursue their degrees. This financial support —stipend, tuition remission, and benefits—is part of the University's commitment to the success of our graduate students.

The University is committed to ensuring that graduate assistant assignments are productive, enhance student qualifications, meet funding support and workload goals, and are consistent with the educational objectives of the student and his or her program.

Categories

The official title of Graduate Assistant (GA) is used in all university documents, but, in general practice, Graduate Assistants are referred to either as Graduate Teaching Assistants (TAs), Graduate Research Assistants (RAs), or Graduate Administrative Assistants (AAs). Additionally, a small number of Graduate Assistants serve as resident life counselors. Qualified graduate students often move between these kinds of appointments during their graduate education.

Administration

Graduate Assistants at the University of Maryland, College Park are under the direct supervision of the department, program, or unit that offers the appointment. The department determines the GA's assignment, supervises his or her work, and recommends him or her for reappointment and promotion to various stipend or compensation levels. The department is the primary source of information for the details of the assistantship. Within the department, the GA's work assignment is determined by the Department Chair, the Director of Graduate Studies, any duly appointed executive committees and assistants to the chair, and/or the faculty member assigned to supervise the GA's particular course, laboratory session, or research project. Graduate Administrative Assistants are under the supervision of the heads of the academic or non-academic units in which they work.

Qualifications

A Graduate Assistant must be a registered graduate student in good standing enrolled full-time in a degree program at the University of Maryland, College Park and must be making satisfactory progress toward the degree. Students enrolled full-time in dual degree programs with another University System of Maryland institution may hold Graduate Assistantship appointments at the University of Maryland, College Park, while completing degree requirements at the partner institution.

Appointments are normally given to those students who have shown superior aptitude in their field of study and who appear likely to render a high quality of service to the university by their teaching or research activities or their administrative work in a unit. Non-degree seeking students are not eligible to hold Graduate Assistantships.

In rare instances, an appointment of a Graduate Research Assistantship (RA) may be made for a graduate student who has been admitted into a graduate degree program at another campus within the University System of Maryland. In this exceptional case, the student will be supported by a Principal Investigator whose research contract or grant is administered by the College Park campus. The student's tuition, benefits, etc. will also be paid from research funds.

STUDENT STATUS

A Graduate Assistant is on an academic appointment not involving academic tenure. The appointment may be for a regular (20 hours per week) or half (10 hours per week) assistantship.

- GAs holding regular 20-hour assistantships must be full-time students. They are full-time students if they are registered for at least 24 units in a semester term or 18 units in a 12-week term program.
- GAs holding half (10-hour) assistantships must be full-time students. They are full-time students if they are registered for 36 units in a semester term or 27 units in a 12-week term program.

Audited courses do not generate units and cannot be used in calculating registration status. Individual departments or graduate programs may have higher registration requirements for their GAs.

For more information about unit requirements, please view the Registration Policies. (p. 1003)

English Proficiency Requirements for International Students

International Teaching Assistants (ITAs) who are non-native speakers of English are required to undergo an evaluation of their spoken English abilities by the Maryland English Institute (MEI). The ITA Evaluation is not required of students who serve only as graders or researchers, or whose entire education has been in the U.S, United Kingdom, Ireland, English-speaking Canada, Australia, New Zealand, Anglophone Africa, or Commonwealth Caribbean. Students must pass the ITA Evaluation

prior to being assigned teaching duties, including duties in labs. This requirement may not be waived.

The Graduate School pays the fee for the ITA Evaluation for students who have been formally appointed as TAs. All other students are responsible for paying this fee. If the department wishes to cover the cost of the evaluation for those students, the Graduate Director must indicate this in writing on the referral form.

Students who fail the ITA Evaluation are required to take an English course. On the basis of the evaluation results, MEI will place the student into either UMEI 006 (pronunciation) or UMEI 008 (broader communication patterns). If the student has been formally appointed as a TA, the department is responsible for the tuition of the course and may not pass the cost of this instruction on to the student. If the student fails the ITA evaluation and is not an ITA, the student is responsible for paying tuition for the course. Tuition remission cannot be used for UMEI courses.

Full details regarding the ITA Evaluation can be found on the Maryland English Institute website (http://marylandenglishinstitute.com/wpdir/english-programs/international-teaching-assistants/).

Appointments

Appointment, Reappointment, Duration of Appointment

Most Graduate Assistants are appointed either for a regular academic year (9.5 months) or for 12 months. Some appointments may be for a shorter period. The academic-year appointment begins in mid-August and ends in May. Students may be reappointed one or more times at the discretion of the department in which they serve. To allow a larger number of qualified students to benefit from assistantships, many departments limit the number of years that a graduate student may serve as an assistant in any capacity. Importantly, once a student completes all degree requirements and paperwork, they are not eligible for assistantships in the next term, including students who complete their degree requirements in between terms (i.e., if a student successfully defends and submits a thesis or dissertation during the winter term then they are not eligible for an assistantship the following spring term).

Each department is responsible for determining and communicating its own specific criteria, within the limits of university policy, for assessing student qualification for appointment and reappointment to a graduate assistantship. In general, reappointment is dependent upon satisfactory performance and normal progress toward a graduate degree. As with all university faculty and staff positions, appointment and reappointment are contingent upon the availability of funds.

Letters of Appointment

It is the responsibility of the department to notify the graduate student in an official letter of the final offer of appointment. These letters provide information on the terms of the assistantship and should be explicit and clear with respect to workload expectations. A template can be found on the Graduate School's Forms webpage (http://gradschool.umd.edu/forms/).

Performance Reviews

Each department is responsible for determining procedures for review and evaluation of Graduate Assistants and for informing GAs of these procedures. The process of evaluation will vary by departments, and may include written assessment of work by an individual faculty member, classroom visitation by designated faculty members, and written student evaluations. The results of reviews and evaluations should be discussed with the GA concerned.

Termination or Loss of Support

A Graduate Assistant's appointment may be terminated before the expiration of its designated term for loss of funding, for cause, for academic delinquency, by written notice, and by voluntary mutual agreement.

1. *Loss of Funding*. A graduate assistantship may be terminated on account of a loss, reduction, or reallocation in appropriation, grant, contract, gift, or other funds with which to support the appointment. Subject to the fiscal priorities of the unit, programs will make a good faith effort to find alternative funding for the full term of the appointment for a GA who is in good standing and making satisfactory progress to degree. The University will give the GA 30 calendar days written notice of termination for loss of funding.
2. *Cause*. An appointment may be terminated immediately for cause. The following are examples of sufficient cause for removal: incompetence, inefficiency, wanton carelessness or neglect of duty, insubordination, repeated or extended absence, and misconduct related to the GA's suitability or capacity to continue to perform assignments. A GA may be suspended from responsibilities with pay pending the investigation of cause for termination of the appointment.
3. *Academic Delinquency*. An appointment may be terminated if the GA is not making satisfactory academic progress to a degree or is otherwise not in good academic standing. The termination shall be in writing and may be immediate or with such notice as the University believes compatible with the GA's academic situation, not to exceed 30 calendar days.
4. *Written Notice*. An appointment may be terminated by delivery of 30 days written notice to the GA.
5. *Voluntary Agreement*. With the agreement of the University, an appointment may be terminated by the voluntary written resignation of the GA.

Special Appeals Process

A Graduate Assistant whose appointment shall be terminated for the reasons 1, 2, 3, or 4 above, may obtain a review by the Chair of the Department under the Informal Consultation procedure in Section VII, below. Thereafter, if desired, the GA may obtain a special review by the Dean of the unit where the assistantship is located.

1. The GA shall initiate the formal review by sending a letter to the College or School Dean with copies to the faculty member and the Department Chair. To be considered, the letter must be received by the Dean within 15 calendar days from the date the GA is first informed of the intent to terminate the assistantship. The grounds for appeal in terminations based on *Loss of Funding, Academic Delinquency*, and *Written Notice* shall be prejudicial procedural error and/or a violation of substantive due process.

2. The burden of proof in these types of termination shall be upon the GA. The burden of proof in terminations for *Cause* shall be on the faculty member to demonstrate that cause exists and warrants termination.

Upon receipt of the letter requesting formal review, the Dean will:

1. Solicit a written response from the faculty member; and,
2. Offer to meet with the GA and the faculty member, either individually or together, before reaching a decision. The Dean shall consult with the Department Chair and such other persons as the Dean believes may be knowledgeable about the matter. The Dean shall endeavor to convey a written decision and, where appropriate, the remedy, to the GA and the faculty member within 10 calendar days of receipt of the letter requesting formal review.
3. The decision of the Dean shall be final in all matters pertaining to the review.

Renewal and Non-Renewal of Appointment

The University does not guarantee an appointment as a Graduate Assistant will be renewed at the end of its designated term. Although appointments are often renewed, the University cannot promise and there can be no expectancy that a graduate assistantship will be continued over an extended period of time.

For assistantships in non-academic units, "Dean" shall mean the Vice President of the division.

A termination would violate substantive due process if it is arbitrary or capricious or if it were based on an illegal or unconstitutional consideration.

Duties and Time Commitments

The assigned duties of a Graduate Assistant are consistent with the objectives of the teaching and research missions of the university, including the objective that assistantships are to be educationally productive for graduate students. Workload expectations of the department, and of the student's advisor/supervisor, should be explicit and clear. The appointment may be full-time (20 hours per week) or half-time (10 hours per week).

Departments are to provide work assignments that GAs receiving full stipends can satisfactorily complete in no more than a 20-hour average work week, and are to ensure that GAs spend no more than 20 hours per week on average throughout the term of appointment on work unrelated to their research. The actual number of hours required to complete assignments in any given week may vary.

Graduate Teaching Assistants

The specific duties of Graduate Teaching Assistants (TAs) vary across disciplines and departments. For the majority of teaching assistants, however, assignments and responsibilities fall into four categories:

- Assuming teaching responsibility for a laboratory or discussion session of a course;
- Assuming teaching responsibility for a classroom section of a multi-sectional course, under the close supervision of the director(s) of the course;
- Assisting a faculty member in the grading, advising, and administrative duties necessary for a course(s);
- Assisting in general departmental administrative duties, such as advising or the administration of community programs, workshops, etc.

Within a department, the particular assignment depends on the department's needs and the experience and academic qualifications of the TA. All graduate TAs serving in any capacity are under the direction and close supervision of a member of the faculty. Prior to the start of the assistantship, supervising faculty member and the TA will meet to review and confirm expectations including a summary for the nature of required duties. To facilitate the discussions, a Statement of Mutual Expectations for Teaching Assistants template can be found on the Graduate School's Forms webpage (http://gradschool.umd.edu/forms/).

Time Commitment: For TAs, the 20-hour average should include the time spent in faculty lectures, class preparation, classroom or laboratory teaching, reading and commenting on student papers or examinations, office consultation, and other duties required to carry out the teaching role. Although it is understood that weekly workload will fluctuate during the term of appointment, a Teaching Assistant with a full-time appointment shall be required to work no more than an average of twenty hours per week during the term of appointment on specifically assigned duties related to his/her appointment, excluding non-TA-related activities associated with academic progress toward the degree. A Teaching Assistant with less than a full-time appointment shall work a prorated portion of a full-time appointment on specifically assigned duties related to his/her appointment, excluding non-TA-related activities associated with academic progress toward the degree.

The time that TAs devote to their assignments varies. The proportion of hours spent in preparation, classroom or laboratory time, and grading, for example, differs from one discipline to another. In some disciplines, a new TA may find that a task such as grading initially requires more time than the usual 20-hour weekly average allows. In determining the amount of time expected for a teaching assignment, consideration shall be given to such factors as type of instruction, number of students instructed, and all other factors, including those specific to the course or group of courses to which the instructional duty expectations apply.

TAs may be required to come to campus prior to the actual beginning of classes to participate in orientation and class-preparation duties. TAs usually complete their formal duties when examinations have been graded.

Graduate Research Assistants

The specific duties of Graduate Research Assistants (RAs) vary according to the nature of the research project in which they participate and the source of the funding. RAs may occasionally be asked to conduct some work at home or to do their research at times when classes are not officially in session. The duties of RAs are also performed under the close direction and supervision of a member of the faculty. Prior to the start of the assistantship, the supervising faculty member and the RA will meet to review and confirm expectations including a summary of the nature of required duties. To facilitate the discussions, a Statement of Mutual Expectations for Research Assistants template can be found on the Graduate School's Forms webpage (http://gradschool.umd.edu/forms/).

Time Commitment: For RAs, the 20-hour average should include the time spent in library and/or laboratory, and on all other research tasks providing assistance to the assigned project.

Graduate students working on research projects funded by grants are often also working on material directly related to their theses or dissertations. It is not unusual in such cases for grant work and personal work to merge and for the work time to consume far more than the usual 20-hour weekly average.

Graduate RAs usually follow the project director's instructions regarding work when classes are not in session.

Graduate Administrative Assistants

A number of academic and non-academic units employ Graduate Administrative Assistants (AAs), generally to perform administrative support functions in an office setting. Such positions are expected to have a research or professional development component. Some administrative appointments are for less than one academic year. Prior to the start of the assistantship, the supervising faculty or staff member and the AA will meet to review and confirm expectations including a summary of the nature of required duties. To facilitate the discussions, a Statement of Mutual Expectations for Administrative Assistants template can be found on the Graduate School's Forms webpage (http://gradschool.umd.edu/forms/).

Time Commitment: For AAs, the 20-hour weekly average should include all time spent on assigned duties, including mandatory training sessions. Unless explicitly stated in writing, AAs are expected to work no more than the 20-hour average work week. If greater amounts of time are periodically required, the unit must provide the AA with an offer letter that includes a statement of expected duties, approximate dates when extra hours might be necessary, and maximum work hours required. If the AA is required to work more than 20 hours in a given week, the time should be deducted from another week.

Just as the unit may require the AA to work more than 20 hours in a given week to meet peak work periods, the AA may request that he or she be allowed to reduce time in a given week to finish a paper or study for an exam and make up the hours later. Such arrangements are allowed and encouraged and should be made between the student and the student's supervisor within the unit.

AAs follow the staff holiday and vacation schedule. Consequently, if the campus is closed (for any reason) for regular staff, AAs who normally would work those days will receive the appropriate compensation and will not be required to make up the hours missed.

Time Away from Duties

The objective of graduate assistantships is education. They are a component of learning and, as practicum, advance understanding through application. Stipends are an acknowledgment both of the expense and need for support during graduate education and of the contribution made by the Graduate Assistant to the mission of the University. The relation between the GA and a professor is academic, partaking of the traditions and practices of the academy. While an appointment as graduate assistant shares some attributes of employment, these are secondary. The following "Time Away" policies reflect these principles.

A. *Accrued Leave.* Graduate Assistants do not earn paid annual, personal, or sick leave.

B. *Time Away from Duty*. Graduate Assistants may have time away from their duties. A full time (20 hours per week), 12-month assistantship is allowed ten workdays (40 hours) of collegially supported absence. Graduate Assistants working full-time on 9- and 9.5-month appointments are allowed 30 hours of absence; Graduate Assistants on half-time appointments will be allowed half of the hours afforded to full-time assistants.

The eligible time is awarded on a calendar year basis and multiple appointments do not increase the amount of time during the calendar year. Time away from duties must be taken while holding an appointment; it may not be accumulated or transferred. It does not include time when the University is closed. Because colleagues must perform the GA's responsibilities during an absence, reasonable notice (at least 7 days, if the need for leave is foreseeable) and prior approval by the GA's supervisor are required.

Time away from duty may be used for such purpose as the GA elects and is, therefore, distinct and separate from allowable leave of absences (https://academiccatalog.umd.edu/graduate/policies/registration-policies/#leave-of-absence) for childbearing, adoption, illness, financial hardship, and dependent care, which allow for semester-long leaves. For example, a GA may use time away from duty for bereavement, short-term illness treatment, unplanned moves, short-term cancellation in childcare, and other unexpected emergencies.

C. *Absence due to Illness*. If a Graduate Assistant becomes ill, time away from duties should initially be supported collegially. Occasional, short-term absences on account of illness generally will not require the use of the allowable "time-away from duty" days.

In the event an absence due to illness extends for a period longer than two weeks, support for time away from duties must be requested by the GA and lies in the discretion of the head of the funding unit (in the case of a State supported assistantship) or of the Principal Investigator or other grant administrator (in the case of an externally funded assistantship). The GA's request must be accompanied by supporting medical documentation satisfactory to the University, including a letter from a physician or other licensed heath-care professional that provides (1) the nature of the illness; (2) a statement that the GA should not return to work for health reasons; and (3) the duration of the required absence. The University may require the GA to have a fitness for duty examination prior to resuming duties.

D. *Absence due to Maternity or Adoption.* On February 20, 2013, the Graduate Council updated the approved *Graduate Assistant Parental Accommodation Guidelines,* subsequently endorsed by the Offices of the Provost and President.

GRADUATE ASSISTANT PARENTAL ACCOMMODATION GUIDELINES

It is important that graduate assistants becoming parents be accommodated; that parental accommodation be regarded as accepted practice; that the terms of an accommodation be reasonable and appropriate; that accommodations within a unit be consistent and equitable in application; and that a request for parental accommodation, if denied, receive timely review.

1. Graduate Assistants will be provided a guaranteed parental accommodation of six weeks, retaining their full stipends and benefits during the accommodation. If both parents are Graduate Assistants, the six-week accommodation will be divided between them.
2. Departments, faculty, and graduate assistants should continue to work collegially on further details of the accommodation, recognizing that these may differ from case to case owing to individual student circumstances and the diversity of assistantship responsibilities. The Graduate School's Parental Accommodation Form (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/parental_accommodation_application.pdf) should be submitted at least eight weeks prior to anticipated leave.
3. A graduate assistant whose request for a reasonable accommodation is not approved should consult first with their Director of Graduate Studies or Department Chair. Next, as needed, graduate assistants

should consult with the Associate Dean for Graduate Education or the Dean of their School or College. If necessary, graduate assistants should consult with the Dean of the Graduate School. Alternatively, the assistant may go directly to the Ombuds Officer for Graduate Students (https://gradschool.umd.edu/about-us/ombuds-office/) for confidential advice and/or informal mediation. The Dean of the Graduate School serves as the final arbiter between the College/School/department and student to resolve any conflicts.

Please visit the University's website (https://uhr.umd.edu/benefits/family-care/) on family care options for additional accommodation options.

Conflict Resolution

A GA who experiences problems related to workload should address them without delay through the process indicated in "Grievance" Section below.

Compensation

Compensation and Stipends

Three categories (called Steps) are currently used for the classification of graduate assistantships. These steps, based on a student's experience and progress toward the degree, determine compensation levels. Graduate Assistants fall into one of the three steps: Step I is only for first-year GAs; Step II is for second-year GAs, as well as for those students, new or continuing, holding a master's degree; and Step III is reserved for doctoral candidates.

The Graduate School sets the minimum stipend level for Step I. Departments and programs determine their own increments for Step II and Step III within guidelines set annually by the Graduate School. All GAs working within a particular step, in a particular unit, should be paid the same assistantship stipend.

TAs must be offered a 9.5-month or 12-month assistantship due to duties and responsibilities occurring after the last day of classes.

Additional Employment: On-Campus

Graduate Assistants may be employed on campus for an additional 10 hours per week beyond their assistantship duties, with an overload approval. No individual may be employed in two capacities in the same department without an overload approval. International students may be limited to a certain number of hours of employment according to their visa status; these students should check with International Student and Scholar Services (http://international.umd.edu/ies/97/).

Domestic students who are GAs and who wish to hold more than one position on campus may do so only if the second position is paid on an hourly basis with Labor & Assistants funds (subcode 2075). This policy is necessary to avoid complications concerning benefits. For such individuals, the only benefits allowed are those associated with the graduate assistantship.

Additional Employment: Off-Campus

It is expected that the combined responsibilities of graduate studies and assistantship duties will fully occupy a student during the academic year. The University, however, does not prohibit Graduate Assistants from accepting outside employment in addition to their assistantship appointment. It is up to the GA to determine how much time, if any, he or she can devote to additional activities while still maintaining satisfactory progress toward the degree and satisfactory fulfillment of the assistantship responsibilities. Departments and programs have the discretionary right, however, to make appointments to students whose commitment suggests that they are most likely to attain their educational goals and maintain their assistantship responsibilities expeditiously and effectively.

Overload Payments for Graduate Students

Overload requests are for temporary, short-term arrangements only. They must be limited to one semester per request and must be received and approved prior to the beginning of the appointment. No graduate student may be employed in two capacities within the same department without an overload approval.

9.5-month Appointments

A full-time GA (20 hours per week) on a 9.5-month appointment must have an overload approval for any on-campus employment above the assistantship assignment while classes are in session for the Fall and Spring semesters.

An overload request must be submitted for Winter Term *only* if the student is teaching a Winter Term course, as a TA or lecturer, in addition to his or her normal assistantship assignment.

An overload request must be submitted for Summer terms *only* if a student (a) is paid in the home unit over four equal pays for summer *or* is paid hourly for 20 hours per week *and* (b) also will be paid in a second unit or in Summer Programs. (The overload form should be completed for the second unit or Summer Programs.)

Graduate Assistants in a 12-week program must submit an overload request for each 12-week term.

12-month Appointments - Semester Term Programs

A full-time GA (20 hours per week) on a 12-month appointment must have an overload approval for any employment above the assistantship assignment when classes are in session during Fall and Spring semesters.

During Winter Term and Summer terms, an overload request must be submitted *only* if the student is teaching a class, either as a TA or lecturer, in addition to the assistantship appointment.

12-month Appointments - 12-Week Term Programs

An overload request must always be submitted for each 12-week term.

International Students

Federal Law prohibits international students from working more than 20 hours per week while classes are in session; international students holding full-time assistantships (20 hours) are therefore ineligible for overload assignments during the Fall and Spring semesters or during a 12-week term.

Sources of Funding

GAs may not be employed in more than one position eligible for benefits; their percentage on payroll may not exceed 50%. Hours over and above the assistantship must be paid with Labor & Assistants funds (subcode 2075).

Retirement and Social Security (FICA)

Retirement benefits are not withheld from the salaries of Graduate Assistants. GAs are exempt from Federal Insurance Contribution Act (FICA) taxes provided that they maintain enrollment and are registered with at least half-time status in the term (Semester or 12-week) they are holding an assistantship.

TAX STATUS

Pursuant to U.S. federal tax code revisions effective January 1, 1987, all graduate students are liable to pay income tax on compensation received for Graduate Assistantships. The amount remitted for tuition is a benefit and is not taxed. A GA with questions about tax obligations should consult a tax counsel or the Internal Revenue Service (1-800-829-1040).

VOLUNTEER GRADUATE ASSISTANT

Under no circumstances should graduate students serve as volunteer graduate assistants, where they are expected to provide service without a graduate assistantship (GA) appointment at the unit's standard stipend level.

Course credit cannot be awarded to a student serving as a graduate teaching assistant in lieu of a GA appointment. Programs may require that graduate students serve as teaching assistants as long as the students receive a GA appointment. Programs may also require that graduate students complete a course in teaching methods, so long as the course does not require students to serve in the capacity of a teaching assistant without a GA appointment.

Rare circumstances that may warrant an exception to this policy must be approved in advance by the Dean of the Graduate School on a case-by-case basis, at the request of the student.

Tuition Remission and Mandatory Fees

Graduate Assistants on a full-time appointment (20 hours per week) are eligible for 10 credits of tuition remission in the Fall and Spring semesters and 6 credits in Winter Term. GAs on a half-time appointment (10 hours per week) are eligible for 5 credits of tuition remission in the Fall and Spring semesters and 3 credits in Winter Term. GAs on a full-time *12-month appointment* are also eligible for up to 8 credits of tuition remission during Summer; and GAs on a half-time *12-month appointment* are eligible for up to 4 credits during Summer.

Tuition remission is credited at the prevailing standard in-state credit hour rate at the time the class is taken. Some programs, such as the MBA, have higher credit hour rates or flat fee pricing. The tuition remission benefit does not cover the difference, which remains the responsibility of the GA.

Tuition remission does not cover Mandatory Fees. Please visit University Human Resources for more information on mandatory fees (https://billpay.umd.edu/GraduateTuition/) and tuition remission (https://uhr.umd.edu/benefits/tuition-remission/).

Residency Classification

All Graduate Assistants on a full-time or half-time appointment are billed at the in-state rate for credits taken during their appointment, including any credits taken over the tuition remission allowance. *Official residency classification, however, does not change.* Consequently, at any time when a graduate student is no longer supported by an assistantship—including summer months if the student is on a 9.5-month assistantship—he or she will be billed according to the official residency status that was assigned upon admission. Thus, a student may pay in-state rates during the academic year but out-of-state rates during the summer if the student is classified as out-of-state. Graduate students are urged to be aware of their official residency classification status and to address any problems immediately.

Contact Residency Reclassification Services at resclass@umd.edu or 301-314-9596 for more information regarding changing residency classification and changing residency statuses.

Health Insurance

Graduate Assistants on a full-time or half-time appointment may enroll in the university employee health benefits program. The personnel coordinator in the student's department should be able to provide appropriate forms. GAs must enroll within 60 days of their initial employment to be eligible for a health care program. GAs may enroll their spouses and children under this program.

Any graduate student who is ineligible for the employee health care program may enroll in the student health insurance program offered by the University Health Center. For more information, call the University Health Center Insurance Office at 301-314-8165.

Facilities and Parking

It is the expectation that departments will provide Graduate Assistants with suitable workspace, laboratory space, and, when necessary, office space. GAs also generally have access to desks, file space, mailboxes, computers, telephones, and duplicating machines or services.

Vehicles must display a valid UMCP parking permit or be parked in metered spaces. While GAs are not assigned to faculty parking lots, the Department of Transportation Services endeavors to assign GAs to a student lot close to the building where they work. Students who register early have the best choice of parking assignments. The Department of Transportation Services is located on the ground floor of Regents Parking Garage, phone 301-314-PARK. Parking for GAs is not subsidized; each GA is responsible for the cost of his or her parking permit.

Conduct and Professional Behavior

A Graduate Assistant's teaching, research, and administrative activities are subject to the ethical precepts and codes of the academic profession, to the laws of the State of Maryland regarding its employees, and to University policies governing institutional obligations. Violation of any of these regulations constitutes a basis for disciplinary action in accordance with procedures set forth in the University's policies.

In their interactions with students, faculty, and all other members of the university community, GAs are expected to conduct themselves with the same sensitivity and thoughtfulness that they expect to receive from others. The University Human Relations Code states that the University of Maryland affirms its commitment to a policy of eliminating discrimination on the basis of race, color, creed, national origin, sex, sexual orientation, marital status, personal appearance, age, physical or mental disability, political affiliation, or on the basis of the exercise of rights secured by the First Amendment of the United States Constitution.

The precepts stated above apply equally to GAs and to supervisors of GAs.

Scholarly Misconduct

Scholarly misconduct means fabrication, falsification, plagiarism or other misconduct in proposing, performing, reviewing, or reporting research and/or in connection with other scholarly or creative activities.

Other terms such as research fraud, scientific misconduct, or research misconduct are subsumed within the term scholarly misconduct. Scholarly misconduct does not include honest error or honest differences of opinion. A finding of scholarly misconduct requires that there be a

significant departure from accepted practices of the scholarly community for maintaining the integrity of the research or scholarly record; the misconduct must be committed intentionally, or knowingly, or in reckless disregard of accepted practices; and the allegation must be proven by a preponderance of relevant evidence.

The full text of the University of Maryland's Procedures for Scholarly Misconduct can be found on the University System of Maryland's webpage (http://www.usmh.usmd.edu/regents/bylaws/SectionIII/III110.html).

Sexual Harassment

The University of Maryland is committed to maintaining a learning and work environment in which students, faculty, and staff can develop intellectually, professionally, personally, and socially. Such an environment must be free of intimidation, fear, coercion, and reprisal. The University prohibits sexual harassment. Sexual harassment may cause others unjustifiable offense, anxiety, and injury. Sexual harassment threatens the legitimate expectations of all members of the campus community. Academic progress or progress in employment is determined by the publicly stated requirements of classroom and job performance, and the campus environment will not unreasonably impede study or work.

Sexual harassment by university faculty, staff, and students is prohibited and constitutes violation of campus policy. Sexual harassment may also constitute violations of the criminal and civil laws of the State of Maryland and the United States. For the purpose of campus policy, sexual harassment is defined as follows: 1) unwelcome sexual advances; or 2) unwelcome requests for sexual favors; and 3) other behavior of a sexual nature where:

- Submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment or participation in a university-sponsored educational program or activity; or
- Submission to or rejection of such conduct by an individual is used as the basis for academic or employment decisions affecting that individual; or
- Such conduct has the purpose or effect of unreasonably interfering with the individual's academic or work performance, or of creating an intimidating, hostile, or offensive educational or working environment.

The full text of the University of Maryland Sexual Misconduct Policy and Procedures can be found online (http://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/Sexual%20Misconduct%20Policy%20%26%20Procedures%20A-C%2013May2016.pdf).

Statement on Sexual Relationships and Professional Conduct

While sexual relationships between instructors and the students in their classes are not prohibited in the sense that penalties are attached to such conduct, all members of the campus community are urged to consider the ethical concerns that may arise as a result of such relationships.

All members of the campus community should understand that sexual relationships that occur in the context of educational evaluation are generally deemed very unwise because they present serious ethical concerns. Many professional codes of conduct prohibit sexual relationships that occur within the context of one's profession. Accordingly, faculty, supervisors, and Teaching Assistants are warned about the possible costs of even an apparently consenting relationship.

The element of power implicit in sexual relationships occurring in the academic-evaluation context can diminish a student's actual freedom of choice. There is doubt whether any such relationship can truly be consensual. In addition, sexual relationships between a faculty member or Teaching Assistant and a student create an environment charged with potential conflicts of interest. Questions of favoritism frequently arise. As a result, such conduct may subvert the normal structure of incentives that spur work and learning and interjects attitudes and pressures that are not consonant with the education policies and principles to which the campus is committed.

The full text of the University's Statement on Consensual Relationships and Professional Conduct can be found at the end of the University of Maryland Sexual Misconduct Policy and Procedures (http://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/Sexual%20Misconduct%20Policy%20%26%20Procedures%20A-C%2013May2016.pdf).

Equal Opportunity Statement

The University of Maryland is an equal opportunity institution with respect to both education and employment. The university does not discriminate on the basis of race, color, religion, age, national origin, sex, or disability in admission to or access to, or treatment of employment in, its programs and activities, as required by federal law (Title VI, Title IX, Section 504) and state laws and regulations. Inquiries regarding compliance with Title VI of the Civil Rights Act of 1964, as amended, Title IX of the 1972 Education Amendments, Section 504 of the Rehabilitation Act of 1973, or related legal requirements should be directed to:

Director, Human Relations Program
Office of Human Relations
1130 Shriver Lab
University of Maryland
College Park, MD 20742
Telephone: 301-405-2838

Inquiries concerning the application of Section 504 and Part 34 of C.F.R. to the University of Maryland may be directed to:

Director, Disability Support Services
0106 Shoemaker Hall
University of Maryland
College Park, MD 204742
Telephone: 301-314-7682 (V/TTY)

Grievance Procedures

The University is an academic and collegial community. Regular and clear communication between Graduate Assistants and their advisors and supervisors is essential to maintaining an effective educational environment. GAs who believe their workload is not in conformity with these *Policies for Graduate Assistantships* may seek a review in accordance with this Section, as well as our Advisor Policy (p. 1046).

In addition to workload, a GA may also seek review under this Section of whether the GA is receiving Overload Payments, Tuition Remission, and Time Away from Duties in accordance with these *Policies*.

For the purpose of this Section, "workload" shall mean the greater of (a) the average number of hours assigned to the GA throughout the term of an appointment (e.g., 20 hours per week), or (b) the average number of hours throughout the term reasonably required for an experienced GA in the GA's department to complete the GA's assigned work.

In all instances noted above, the GA should attempt to resolve these matters locally, collegially, and informally. If the difficulty has not been resolved to the GA's satisfaction through informal means, then he or she may elect to file a formal grievance.

Informal Consultation

The Graduate Assistant should first attempt to resolve the difficulty by discussing the situation with his or her faculty advisor/supervisor as expeditiously as possible.

1. In the case of a TA, this usually would be the professor in charge of the course; in the case of an RA, the director of the research project on which the student is working; in the case of an AA, the immediate supervisor of the student in the unit in which the student is working.

The GA should provide the reasons for complaint and a suggested resolution/remedy.

If a satisfactory resolution is not reached, the GA should next discuss the situation with the Chair of the Department.

2. Either before or after such discussions, the GA may wish to seek advice from another academic advisor, the Director of Graduate Studies of the GA's program, an associate dean of the Graduate School, or the Ombuds Officer for Graduate Students. The GA is strongly encouraged to consult with the Ombuds Officer early in the informal discussion process, and must consult with the Ombuds Officer before initiating a formal grievance.

Ombuds Officer for Graduate Students

The Ombuds Officer is available to all graduate students with questions or concerns related to their graduate experience, including their roles as GAs. The Ombuds Officer provides informal assistance in resolving conflicts and works to promote fair and equitable treatment within the University. The Ombuds Officer works confidentially within the scope of the law. The purpose of the Ombuds Officer is to ensure that the graduate student's voice is heard and that problems receive prompt and impartial attention. The Ombuds Officer does not advocate for an individual; rather, the Ombuds Officer advocates for a fair process that promotes the University's commitment to excellence in graduate education and in the graduate student experience. Queries may be directed to Ombuds Officer for Graduate Students, The Graduate School, 2103 Lee Building, phone (301) 405-3132.

Please see our Advisor Policy (p. 1046) for more information.

Formal Grievance

Most problems related to assistantships are resolved through informal consultation. If a problem pertaining to Workload, Overload Payment, Tuition Remission, or Time Away for Duties has not been solved informally to the GA's satisfaction, he or she may initiate a formal grievance. The formal procedures outlined below are intended to provide a mechanism through which grievances related to assistantships can be formally made and decided.

The Grievance Procedure

The process of formal consideration offers the GA a review by the Dean of the Graduate School or by a panel appointed to make a recommendation to the Dean of the Graduate School. The steps are as follows:

If a satisfactory resolution has not been achieved following informal consideration by the Chair of the Department, the GA may initiate a formal grievance by sending a letter to the Dean of the Graduate School. To be considered, it must be received by the Graduate Dean within 30 calendar days from the action involved or from the GA having reasonable knowledge of it. Under exceptional circumstances, that deadline may be extended at the discretion of the Graduate Dean.

1. The letter must be signed and:
    a. Contain a clear description of the facts giving rise to the grievance; and,
    b. Identify the provision(s) of these *Policies for Graduate Assistantships* which have been violated; and,
    c. Set forth the desired remedy; and,
    d. Be copied to the faculty member and the Chair of the Department.
    e. Elect to have the Graduate Dean decide the grievance either:
        i. In the manner described in Paragraph 2.c., below; or,
        ii. Following receipt of a recommendation from a three-person panel appointed by the Graduate Dean to consider the matter.
2. Upon receipt of a letter of formal grievance, the Graduate Dean will:
    a. Share the letter with the Dean of the appropriate college or school; and,
    b. Solicit a written response from the Department Chair.
    c. Offer to meet with the GA and the faculty member, either individually or together, before reaching a decision. The Graduate Dean shall consult with the Academic Dean and such other persons as the Graduate Dean believes may be knowledgeable about the policies and practices involved. The Graduate Dean shall endeavor to convey a written decision and, where appropriate, the remedy, to the GA and the faculty member within 15 calendar days of receipt of the letter of grievance.
    d. If the GA elects to have a panel, the Graduate Dean will appoint two graduate faculty (one of whom shall chair the panel) and one graduate student, each familiar with the GA's discipline but not from the GA's program or department, to review the matter and make a recommendation. The Graduate Dean will provide the panel with the letter of formal grievance and the written response of the Department Chair. The panel shall offer to meet with the GA and the faculty member and proceed in the manner described in Paragraph 2.c, above.

        The Panel shall provide the Graduate Dean a written report containing a statement of the issues, the panel's findings of fact, the controlling policy provisions, the panel's conclusions regarding the merits of the grievance, and a recommended disposition of the grievance, including any suggested remedy.

        The Graduate Dean shall decide the grievance and fashion any necessary remedy, giving substantial weight to the findings, conclusions, and recommendations of the panel.

The decision of the Graduate Dean regarding the merits of a grievance and, where appropriate, the remedy, shall be final.

General Principles Controlling Formal Grievance Procedures

These Section VII procedures are not intended to mimic a courtroom and be adversarial in nature. Rather, they are formal in the meaning of offering a structured method to investigate, weigh and remedy differences. They are designed to preserve collegiality and minimize injury to the student-faculty relationship. Because grievances, if not made known or not considered expeditiously, threaten the learning experience, GAs, faculty, and administrators share responsibility alike to deal with them promptly.

Experience has shown that the following rules promote the orderly and efficient disposition of grievances. Accordingly, they shall be observed:

1. There is a burden of proof. The GA has the responsibility of convincing the Graduate Dean or panel of three things: a) that the *Policies of Graduate Assistantships* has not been followed; b) that the GA has been adversely affected; and c) and that the requested remedy is appropriate.
2. All matters to be considered in support or defense of a grievance should be made known as early in the informal process as possible. Absent extenuating circumstances, matters not raised in the informal process should not be considered in the formal process. In both the informal and formal process, it is the responsibility of the GA and faculty member, respectively, to produce in a timely way the evidence they each wish considered, including any documents and witnesses.
3. The Grievance Procedure is not a trial. Formal rules of evidence commonly associated with criminal and civil trials may be counterproductive in an academic investigatory process and shall not be applied. The Dean, Graduate Dean, and three-member panel shall give effect to the rules of confidentiality and privilege, but shall otherwise accept for consideration all matters which reasonable persons would accept as having probative value in the conduct of their affairs, giving it such weight as they consider proper. Unduly repetitive, irrelevant, or personally abusive material, however, should be excluded. They may also consider matters within the common knowledge and experience of University faculty, including published policies of the University System of Maryland and the University of Maryland.
4. The GA may be assisted at any meeting by an advisor, who must be a registered, degree-seeking graduate student at the University. Although the GA is expected to take an active role in all meetings, the advisor may help with the presentation of arguments and evidence.
5. The University has in place other grievance procedures and administrative processes designed to address specific types of claims. These are meant to be the exclusive avenue for review and redress. Grievances that by their subject matter may be considered under other established institutional procedures must be brought under those procedures and may not be considered under this these Section VII formal procedures. Matters pertaining to the general level of wages, wage patterns, fringe benefits, or to other broad areas of financial management and staffing are not grievable. Matters expressly excluded from consideration under other procedures may not be grieved under these Section VII formal procedures. These procedures also may not be used to challenge faculty judgment about a GA's academic performance (including, for example, test scores, grades, waivers, dissertation defenses and other indicia of mastery of subject matter and taught skills).
6. The filing of a grievance does not relieve the GA of the obligation to perform all duties as assigned unless and until otherwise decided pursuant to a decision under these procedures. All remedies will operate prospectively. Financial awards (e.g., "back pay," "damages," "compensation," and "raises") may not be awarded. The acceptance of a proposed remedy by the GA shall terminate the grievance process. The matter may not then be further considered or additional remedies sought under other campus procedures.
7. A decision may not be made at any step that conflicts with or modifies a policy, regulation, or grant of authority approved by the Board of Regents, the Chancellor, the President, the Provost, or the University Senate or with any applicable Federal or State of Maryland law.
8. Only currently enrolled University of Maryland graduate students may initiate a formal grievance. The grievance must pertain to the GA's personal services, not those of another GA. Group grievances are not permitted, although similar grievances may be consolidated and processed together as a single issue. As a general matter, where a number of individual grievances have been reduced into a single grievance, not more than three GAs selected by the group may be excused from their duties to attend.
9. Because it is critical to address potentially corrosive grievances sooner than later, and because the remedies available are prospective, the time requirement established for initiating a formal grievance is necessary to the effective administration of the graduate program. Unless otherwise agreed in advance among the GA, the faculty member, and the Graduate Dean, strict adherence to them is a condition of review and appeal under these Section VII procedures. Time requirements are measured from the first occurrence of an event; "continuing" wrongs are not recognized for the purpose of satisfying time requirements.
10. The Graduate Dean may delegate such parts of his responsibilities as he deems reasonable and efficient, provided the final decision and any remedy must be reviewed and approved by the Dean personally.

In this Section VII, the term "faculty member" designates the individual directing and supervising the GA. Depending on the circumstances of the GA's appointment, this person may, in fact, be a University staff employee, and not on the faculty. It is the design of these procedures that the GA first raise the matter of concern with the individual whose direction or decision has given rise to complaint.

In this Section VII, the term "Chair of the Department" shall also mean, as appropriate to the GA's appointment, the Program Director or the unit head in non-departmental colleges and schools and in administrative departments.

For the purpose of this Section VII, "Dean of the appropriate college or school" or "Dean of the unit" means the academic dean of the unit where the assistantship is located. For assistantships in non-academic units, "Dean" shall mean the Vice President of the division.

These include, for example, the *Code of Academic Integrity*, the *Policy on Arbitrary and Capricious Grading*, the *Code of Student Conduct*, the *Procedures for Scholarly Misconduct*, the *Human Relations Code*, the *Policy and Procedures on Sexual Harassment*, the *Policy on Student Classification for Admission and Tuition Purposes*, the *University of Maryland Policy on Intellectual Property* and the *Policy on Acceptable Use of Information Technology Resources*.

The resolution of a "workload" grievance, for example, may entail a reduction in work hours, future overload pay when approved and budgeted, time management training, and referral to the Center for Teaching Excellence.

Graduate Student Fellowships

Graduate fellowships are merit-based awards that enable the recipient to focus on graduate study, that do not have to be repaid, and that generally include both a stipend and tuition remission. Fellowships differ from Graduate Assistantships, which carry an obligation to teach classes, to work on a research project, or to perform administrative tasks.

Fellowship offers are made by graduate programs to incoming students as part of a recruitment package; some are made to current students through competitive awards processes. Applicants to graduate programs

and current students should contact the relevant program for more information on available fellowships.

Fellowships are funded either internally, through several Graduate School's Fellowship programs, or externally, through a variety of outside funding agencies. A list of the Graduate School Fellowship and Award Programs can be found here (http://gradschool.umd.edu/funding/student-fellowships-awards/).

The University of Maryland is committed to diversity and encourages programs to offer support to a diverse range of students consistent with campus principles of equal opportunity.

Status

Fellowships and scholarships are offered only to graduate students admitted to or enrolled in graduate degree programs at the University of Maryland. Fellows and scholars are expected to devote themselves full time to graduate study and to register full time as defined by the unit system. Students on fellowships and assistantships must be registered for **48** units. Audited courses do not generate units and cannot be used to determine full-time status. Fellows who also hold half-time assistantships need only register for **36** units to maintain full-time status.

Doctoral Candidates are automatically registered for Candidacy Tuition (899) each semester. This will satisfy the unit requirement for full-time status.

For more information about unit requirements, please view the registration policies page. (http://pdc-webapp-lamp27.umd.edu/Catalog/policy.php?registration-policies)

Qualifications

Students whose records indicate superior academic achievement and promise and who will increase diversity in their graduate program may be nominated for fellowships and scholarships. The determination of academic merit is based on undergraduate and graduate Grade Point Averages (GPA); scores on such national tests as the Graduate Record Examination (GRE) (http://www.ets.org/gre/), Graduate Management Admissions Test (GMAT) (http://www.mba.com), and the Miller Analogies Test (MAT (http://www.milleranalogies.com)); the judgment of academic professionals in letters of recommendation; the nominee's Statement of Goals and Research Interests; and the nominee's Statement of Experiences.

External Fellowship Funding

External Graduate Fellowships are fellowships sponsored and funded by organizations outside the university. Corporations, charitable foundations, and numerous other groups fund graduate fellowships.

Private and Non-University Sponsored Fellowships. UMCP has several government and privately funded fellowships that are handled through the graduate programs and colleges. Some of these fellowships are won independently by students in national competitions; others are awarded directly to the colleges or programs, which then select student recipients. Students submitting applications for admission to graduate programs will be considered for such awards as appropriate; no additional application forms are required. Our graduate students are supported on fellowships from the Department of Defense, Ford Foundation, National Science Foundation, Woodrow Wilson National Fellowship Foundation, to name just a few. In addition, several graduate programs sponsor fellowship programs jointly with federal agencies, such as the National Institutes of Health, NASA, and the National Institute of Standards in Technology.

Matching Tuition Scholarships for External Fellowships. These scholarships are awarded, subject to the availability of funding, to students who have received external fellowships that provide a stipend, but do not provide separate funds to cover the cost of tuition. The Graduate School policy on External Fellowship Tuition Remission is listed here.

Fellowship & Award Offer Letters

A formal offer letter specifying the award of a **Graduate School fellowship** is sent to the student from the Dean of the Graduate School in the spring semester. This letter specifies the stipend level, the duration of the commitment, the amount of tuition remitted, and the details of the fellowship or scholarship.

Duties

No service of any kind, either during the tenure of a scholarship or fellowship or in the future, is to be required of a fellow or scholar by their mentor or their graduate program. Fellows and scholars will carry out independent research under the supervision and guidance of-and sometimes in collaboration with-their mentors. Typically, at the start of their tenure as fellows or scholars, inexperienced students will require more supervision and guidance. Eventually, however, fellows in particular, should be treated as junior research associates. Under no circumstances are they to be assigned routine technical or administrative duties or given teaching assignments during the years in which they are supported by fellowships or scholarships.

Supplementation of Support

Students are not allowed to hold two full fellowships ($17,500 or higher each) concurrently. Please contact the graduate school if this situation occurs.

Gifts, departmental fellowships, or other special funds may provide additional support, in an amount not to exceed half the stipend of the fellowship or scholarship. If the fellowship allows, the fellow may be supplemented by an appointment to a position such as a half-time or quarter-time graduate assistantship, or by hourly employment not to exceed 10 hours per week.

Domestic students must consult the award's Memorandum of Understanding (MOU) or the Award Guidelines to determine eligibility for supplementary employment. International students should consult International Student and Scholar Services (http://globalmaryland.umd.edu/offices/international-students-scholar-services/) by phone at 301-314-7740, regarding supplementary employment while on fellowship.

Additional On-Campus and Outside Employment

According to university policy, full- time fellows and scholars may work on-campus or off-campus for a maximum of 10 hours per week in addition to holding the fellowship or scholarship as long as the fellowship or scholarship rules allow for supplementary employment. This policy applies to all fellowships, all scholarships, and all additional employment regardless of the source of funds. This restriction on employment is

intended to assure that students make rapid progress toward their degrees.

International fellows should consult International Student and Scholar Services (https://globalmaryland.umd.edu/offices/international-students-scholar-services/) by phone at 301-314-7740, regarding supplementary employment.

Deferral or Duplication of Support

Students are not allowed to hold two full fellowships or scholarships, either internal or external awards, or a combination of both, simultaneously. Fellows or scholars who receive offers of external fellowships, such as National Science Foundation (http://www.nsf.gov/funding/), Ford Foundation Fellowships (http://www.fordfound.org/), or any other private or university-administered fellowships may request to defer their Graduate School fellowship or scholarship offer until such time as their other fellowship expires. Assuming satisfactory academic progress at that time, the student may again resume the Graduate School fellowship or scholarship.

Overload Payments for Graduate Fellows

If a circumstance arises that a fellow must work over the 10 hours per week, an overload form is necessary. This includes the winter term. Overload requests should be for temporary, short-term arrangements only. The request must be limited to one semester per request and must be received and approved by the Graduate School prior to the beginning of the appointment.

Stipend Disbursement

Fellowships are awarded for the academic year only. Stipend disbursements for US citizens and Permanent Residents may be given in lump sums at the start of each semester or spread out monthly. This disbursement is processed through the student award system. For international students, those on a J1 or F1 visas, the disbursement must be processed through payroll. Fellows must receive stipends within the ranges below in order to qualify for associated benefits.

Tuition Remission and Mandatory Fees

The Graduate School provides tuition remission to graduate fellowship recipients who are paid from University and Dean's Fellowship funds, or from external fellowship funds meeting the criteria specified below. Tuition remission and health insurance subsidies are subject to continued availability of resources. Tuition remission will be provided only for credits that are degree applicable.

Graduate Fellows Holding University or Dean's Fellowships

- A **University Fellow** may be eligible for up to 10 credits of fellowship tuition remission per semester (Spring and Fall only). **A University Fellowship (UF)** must supplement a standard support package (assistantship, external fellowship, Dean's Fellowship, and/or other internal fellowship). Tuition remission credits deriving from that support package will be applied first and augmented by fellowship tuition remission up to the maximum remission indicated below:

Type	Funding Per Year	Total Annual Credits	Fall	Spring
University Fellowship (paid in 1yr)	$20,000	20	10	10
University Fellowship (paid over 2 yrs)	$10,000	10	5	5
University Fellowship (paid over 4 yrs)	$5,000	0	0	0

- A **Dean's Fellow** maybe eligible for up to 10 credits of fellowship tuition remission per semester (Spring and Fall only). A **Dean's Fellowship (DF)** may be combined with a University Fellowship, additional Dean's Fellowships, and/or other funding (assistantship, external fellowship, and/or other internal fellowship) to create the support package. Tuition remission credits deriving from other funding will be applied first. Tuition remission credits for **Dean's Fellowships** will be provided up to the maximum remission indicated below:

Type	Funding Per Year	Total Annual Credits	Fall	Spring
Dean's Fellowships	≥$17,500	20	10	10
Dean's Fellowships	≥$10,000	10	5	5
Dean's Fellowships	$7,500	0	0	0

NOTE: For FY23, budget permitting, the intention is to raise the minimum stipend for Graduate Fellowships to $18,750 for 9-month Fellowships and $25,000 for 12-month Fellowships. This means the DF funding per year in the table above will need to be $20,000 (or more) per year in order to be eligible for up to 10 credits each fall/spring, due to the $2500 DF award increment requirement. The remainder of the table remains the same.

1. **Graduate Fellows Holding Prestigious External Fellowships** (use the *Request for Tuition Remission for External Fellowships and Scholarships* form found on the Graduate School Forms (https://gradschool.umd.edu/forms/) page on the Graduate School website.

   Graduate students holding **prestigious external fellowships** may be eligible for fellowship tuition remission. A Memorandum of Understanding (MOU) or contractual agreement must be filed with the Graduate School. Unless otherwise specified in the MOU or contract, fellowship tuition remission credits up to 10 credits will be awarded as follows:

   - A prestigious external fellowship carrying an annual stipend of at least $17,500 may be awarded up to 10 credits of tuition remission per semester.
   - A prestigious external fellowship carrying an annual stipend of at least $7,500 may be awarded up to 5 credits of tuition remission per semester.
   - A prestigious external **fellowship carrying an annual stipend of less than $7,500 is not eligible for tuition remission**

2. **Graduate Fellows on Federal Training Grants**

   (use the *Training Grant Fellowship Matching Tuition Remission Request* found on the Graduate School Forms (https://gradschool.umd.edu/forms/) page on the Graduate School website,

Federal Training Grants covering only partial tuition for fellows may be eligible for an institutional match of fellowship tuition remission. Upon written agreement with the Graduate School, tuition remission may be awarded to Training Grants on a 60% (grant) / 40% (GS) matching basis.

3. **Graduate Fellows Holding Internal Fellowships Other Than University or Dean's Fellowships**
   Fellowship tuition remission is not awarded to fellowships funded from department or college sources; state monies from any source, including DRIF, UM, and UMCP Foundations, unless formal agreements have been made with the Graduate School. Tuition for these fellowships should be charged to the account to which the stipend is being charged.
4. **Tuition Remission for Summer Sessions and Winter Term**
   Fellowship tuition remission is not awarded for Summer Sessions or Winter term.
5. **Tuition Remission for Programs with Non-Standard Tuition**
   Fellows enrolled in graduate programs with non-standard tuition rates (whether by course or by flat-fee pricing) will be responsible for tuition costs above the standard rate covered by fellowship tuition remission.
6. **Other**
   The Graduate School's Graduate Dean's Fellowships, the Wylie Dissertation Fellowships, the Lee Thornton Fellowship, the Spencer Award, and the Longest Award are eligible for candidacy fellowship tuition remission. Please see the official Fellowship Guidelines for each of these fellowships for complete information about tuition remission eligibility. Fellowships and Award guidelines can be found on the Graduate School Funding web page (https://gradschool.umd.edu/funding/student-fellowships-awards/).

Residency Classification

The official residency classification of students holding fellowships, assistantships, and scholarships does not change as result of their awards, but remain resident or non-resident as indicated in the original admissions offer. Fellows and scholars who also hold a half-time graduate assistantship will be billed in-state tuition as a benefit of their status only while they hold that assistantship. When/if the graduate student is no longer supported by the assistantship-including summer months if the student is on a 9.5-month assistantship-he or she will be billed according to their official residency status determined at the time of their admission.

Students are expected to be aware of their official residency classification status, how their assistantship, scholarship, or fellowship may affect their billing for each semester, and to address any problems immediately to avoid incurring unexpected tuition charges.

Questions about residency classification and changing status for those who intend to become residents of the State of Maryland for tuition and billing purposes under the University System of Maryland Board of Regents policy should be addressed to:

Residency Classification Office
Room 1130 Mitchell Building
Phone 301-314-9596
Web: registrar.umd.edu/resreclass.html (http://www.registrar.umd.edu/resreclass.html)
Email: resclass@umd.edu

Tax Status

Fellows and scholars must pay tax on the stipends they receive to cover living and general expenses, but may deduct certain educational expenses. Amounts awarded in payment of tuition are not taxable for fellows. Taxes are not withheld from stipends disbursed through student financial aid so you may choose to file an estimated tax payment. Please refer to the *Internal Revenue Service Tax Publication 970, Benefits for Education*, for more information regarding the tax status of fellowship and scholarship stipends or call 1-800-829-1040.

Health Insurance

Full-time Graduate fellows supported by **University Fellowships**, **Dean's Fellowships**, or **prestigious external fellowships** are eligible to receive a reimbursement up to the annual Student Health Insurance Plan (SHIP) premium for *individual coverage*. Family health insurance is not covered.

The UHC plan must be purchased *prior* to submitting a request for reimbursement to the Graduate School. The Health Insurance Reimbursement Request Form can be found on the Graduate School Forms (https://gradschool.umd.edu/forms/) page.

University or Dean's Fellows must provide a Health Insurance Reimbursement Request Form, proof of payment, and copy of insurance card.

Holders of prestigious external fellowships must provide a Health Insurance Reimbursement Request Form, proof of payment, copy of insurance card and a copy of the fellowship MOU or contract.

Ann G. Wylie Dissertation Fellows are entitled to a sum of up to $1,000.00 in addition to their stipend for the cost of the health insurance premium for one semester of coverage.

Lee Thornton Dissertation Fellows are entitled to a sum of up to $1,000.00 in addition to their stipend for the cost of the health insurance premium for one semester of coverage.

The following graduate fellows are *not* eligible for this subsidy: fellows holding *internal* fellowships other than University or Dean's Fellowships; fellows holding half or full-time assistantships entitling them to employee health insurance benefits; and fellows who are part-time students.

For information on the United Health Care plan, please visit the University Health Center website at health.umd.edu/insurance (http://www.health.umd.edu/insurance/). United Health Care offers online enrollment at firststudent.com/ (http://www.firststudent.com/).

Vacation and Sick Leave

There is no policy on vacation and sick leave for fellows or scholars. Fellows and scholars are required to maintain satisfactory academic performance in order to retain their support. A fellow or scholar may request deferment of a semester or year of fellowship tenure if documented personal illness prevents him or her from satisfactorily completing academic requirements.

Facilities

Fellows are fully integrated into departmental activities and are to be provided with the same facilities as other graduate students, such as mailboxes, office space, access to a telephone and computer, and email and internet access.

Academic Record

Developing a Program

The student is responsible for ascertaining and complying with the policies and procedures of the Graduate School and all applicable graduate program requirements that govern the individual program of study. Registration for the newly admitted graduate student seeking a certificate or degree begins with a visit to the student's academic advisor in the graduate program to which the student has been admitted. There the student will obtain information about specific certificate or degree requirements for satisfactory progress that supplement those of the Graduate School. The student should consult the *Schedule of Classes*, and should develop an individual program of study and research in consultation with his or her graduate advisor. Students admitted as Non-Degree Seeking Students may seek advice from the Graduate School , Graduate Directors, or from appropriate faculty members. Petitions for waivers of regulations of graduate degree requirements or for appeals of decisions of graduate program faculty or administrators should be directed to the Dean of the Graduate School, 2125 Lee Building.

Academic Integrity

The University is an intellectual community. Its fundamental purpose is the creation and dissemination of knowledge. Like all other communities, the University can function properly only if its members adhere to clearly established goals and values. Essential to the fundamental purpose of the University is the commitment to the principles of truth and academic honesty. The Code of Academic Integrity is designed to ensure that the principle of academic honesty is upheld. While all members of the University community share this responsibility, The Code of Academic Integrity is designed so that special responsibility for upholding the principle of academic honesty lies with students.

Honor Pledge

On every examination, paper or other academic exercise not specifically exempted by the instructor, the student will write by hand and sign the following pledge:

I pledge on my honor that I have not given or received any unauthorized assistance on this examination.

Failure to sign the pledge is not an honors offense, but neither is it a defense in case of violation of this Code. Students who do not sign the pledge will be given the opportunity to do so. Refusal to sign must be explained to the instructor. Signing or non-signing of the pledge will not be considered in grading or judicial procedures. Material submitted electronically should contain the pledge; submission implies signing the pledge.

On examinations, no assistance is authorized unless given by or expressly allowed by the instructor. On other assignments, the pledge means that the assignment has been done without academic dishonesty, as defined in the Code of Academic Integrity, available online (https://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/III-100A.pdf).

The pledge is a reminder that at the University of Maryland students carry primary responsibility for academic integrity because the meaningfulness of their degrees depends on it. Faculty are urged to emphasize the importance of academic honesty and of the pledge as its symbol.

Penalties for Violations of Academic Integrity

Students who are found to have falsified, fabricated, or plagiarized in any context, such as course work, laboratory research, archival research, or thesis / dissertation writing--will be referred to the Office of Student Conduct. The Office of Student Conduct (https://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/III-100A.pdf) has some discretion in determining penalties for violations of the University's standards of academic integrity, but the normal sanction for a graduate student found responsible for a violation of academic integrity will be dismissal (suspension or expulsion) from the University.

To review the whole policy on academic integrity, see the University of Maryland Code of Academic Integrity (https://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/III-100A.pdf). The Code was amended on November 7, 2014.

Academic Record (Transcript)

A graduate student's academic record (transcript) is intended to serve as a complete history of the student's academic progress at the University of Maryland. Under no circumstances will academic records be altered because of dissatisfaction with a grade or other academic accomplishment.

Grade Point Average Computation

The A+ and A is calculated at 4 quality points, A- at 3.7 quality points, B + at 3.3 quality points, B at 3 quality points, B- at 2.7 quality points, C+ at 2.3 quality points, C at 2 quality points, and C- at 1.7 quality points. The grades of D+, D, D-, F, and I receive no quality points. Students do not earn credit toward the degree for courses in which they receive a grade of D +, D, D-, or F. For graduate students, all courses taken that are numbered 400 and above (except 500-level courses, those numbered 799, 898, or 899, and those graded with an S) will be used in the calculation of the grade point average. A student may repeat a course in an effort to earn a better grade. Whether higher or lower, the most recent grade will be used in computing the grade point average. Grades for graduate students remain as part of the student's permanent record. Changes in previously recorded grades may be made if made within one term (semester or 12-week term) from original posting of the grade and if the original instructor certifies that an actual mistake was made in determining or recording the grade. The change must be approved by the department chair and the Dean of the Graduate School. Graduate credit transferred from another institution will not be included in the calculation of the grade point average.

Criteria for Courses to be Accepted for Graduate Credit

Any courses, workshops or seminars that take place in a span of time less than a normal academic term (semester or summer session or 12-week) and offering graduate credit to the participants must meet the following criteria:

- There must be 15 "contact hours" per graduate credit.
  - Lectures: 50 minutes of lecture are equivalent to 1 contact hour.
  - Non-lecture contact (laboratories, workshops, discussion and problem-working sessions, etc.): One two-hour or three-hour session is equivalent to one contact hour.

- No more than three "contact hours" per day will be permitted. (Three "contact hours" are equivalent to 0.2 credits).
- Credit may be accumulated at the rate of no more than one credit per week.
- Courses numbered at the 100-, 200-, 300, and 500-level are ineligible for graduate credit. 400 level classes are eligible for graduate credit provided they were not used in fulfillment of an undergraduate degree requirement.

Credit for Alternative Learning

The Graduate School supports alternative learning experiences that advance graduate students' programs of study and aid in developing skills that prepare them to be successful for a broad range of career paths. Alternative learning experiences include internships, practicums, or field experiences taken while a student is enrolled in a degree at the University of Maryland. Graduate programs may establish their own courses for alternative learning (e.g., internship courses), or may provide for individual alternative learning experiences through an independent study course (e.g., 798). In other cases, credit for alternative learning can be provided by examination or by petition.

The graduate program in which the student is enrolled may establish a limit on the number of credits that may be earned in this manner, as long as it is at or below the Graduate School limit (see below). Courses replaced by alternative learning credit cannot be repeated for credit. Alternative learning credit will not be included in the calculation of the grade point average, but credit for alternative learning can count toward the completion of a student's degree program.

CREDIT BY EXAMINATION

Credit by examination will be awarded upon successful completion of a formal examination (typically written) at a normal standard for examinations within the department or program. The examination must be approved by a committee composed of the examiner plus two full members of the graduate faculty. A copy of the examination, the student's answers, and the names of the examiner and the other committee members must be placed in the student's file in the department or program.

Normally, credit by examination is not available for 600 level and higher courses. The maximum number of credits by examination that can be applied to a 30-credit master's degree is 12 for a non-thesis master's degree and six for the thesis option. Information on fees for credit by examination is available from the Office of the Registrar.

OTHER CREDIT BY PETITION

Programs may determine that certain courses completed at organizations other than accredited colleges or universities, such as the Smithsonian Institution, are equivalent to graduate-level courses and qualify for other credit. Other credit is not earned through traditional coursework or examination, and does not fall within the Graduate School's Transfer of Credit policy (p. 1024). The quantity and type of work to be considered for other credit (such as contact hours, lectures, labs, and workshops) must correspond with the Graduate School's policy on Criteria for Courses to be Accepted for Graduate Credit (p. 1022).

Students can petition for up to six hours of other credit toward the completion of their degree, with the exception of thesis and dissertation research credits (799, 898, and 899). Other credit is not available to students in certificate programs.

Students interested in participating in courses that fall under the category of other credit are advised to seek departmental approval of such courses before enrolling. Departments are advised to consult graduate credit policy and the petitions criteria described below as a guide for approving courses. These criteria are rigorous. Accordingly, programs should only consider supporting petitions for other credit only from well-established, high-quality, and rigorous programs. Once the course is completed, students can petition the Graduate School for credit.

Petitions must include:

- Proof that the student has passed the course via description of assessment or culminating project;
- Written statements of approval by the director of graduate studies and the thesis or dissertation advisor, when applicable;
- A statement from the program administering the course which explains how the course is equivalent to a graduate course at an accredited US institution (prior acceptance of the course by other accredited institutions is especially meaningful); and
- A detailed description of the course, including information about program instructors, who should have credentials that correspond at least with those in the Graduate Teaching Faculty category at the University of Maryland.

Petitions must be approved by the Dean of the Graduate School before submission to the Office of the Registrar.

Incomplete Grades

An incomplete is a mark that an instructor may award to a student whose work in a course has been qualitatively satisfactory, but who is unable to complete some portion of the work required *because of illness or other circumstance beyond the student's control.* In awarding the mark of "I" for graduate courses other than 799 and 899, instructors must fill out an "Incomplete Contract for Graduate Students." The contract will specify the work remaining to be completed, the date by which the work must be completed, and the letter grade that will replace the incomplete if the work is not completed by the date specified. It must be signed by the instructor and the student and maintained by the department offering the course. The student is responsible for providing a copy of the contract to the director of graduate studies in his or her program. All courses must receive a grade by the time the student graduates.

The mark of incomplete in 500-, 600-, 700-, and 800-level courses will automatically roll-over to letter grades if the work is not completed by the specified date. Students are expected to complete courses in which they have received an "I" by a date no more than twelve months from the beginning of the term (semester or 12-week) in which the course was taken or by date of graduation. A course is considered complete in the semester that the contract is fulfilled. The mark of incomplete in 400-level courses will be governed by the rules for awarding incompletes to undergraduate students, including the provision of automatically converting an "I" to a letter grade.

Advisors should stay current with their students in urging completion of incomplete grades, and programs should review the status of incompletes in their annual reviews of students' progress toward their degrees. Students will remain in good standing despite marks of incomplete if the courses are not required for their degrees. For courses required for graduation, students will be considered to be making satisfactory progress only if they fulfill the conditions of any outstanding

incomplete contracts in a timely manner. An "I" can remain in place on a student's transcript for a maximum of one year.

Departments and programs may specify the maximum number of incomplete credits students may carry. It is the responsibility of the instructor or department chair concerned to submit the grade promptly upon completion of the conditions of the Incomplete contract. If the instructor is unavailable, the department chair, upon request by the student, will make appropriate arrangements for the student to complete the course requirements.

Transfer of Credit

All graduate study credits offered as transfer credit must meet the following criteria:

- The student must have earned a grade of "B-" or better in the course.
- The credit must not have been used to satisfy the requirements for any other degree.

Credits Earned at Another Institution. No more than six credit hours of graduate work may be transferred from another institution, unless the program has special approval by the Dean of the Graduate School. The courses must be graduate level and have been taken for graduate credit at a regionally accredited U.S. institution or foreign university. The student must furnish an official transcript to the Graduate School. Graduate credit transferred from another institution will not be included in the calculation of the grade point average.

Credits Earned at the University of Maryland. When changing programs within the University of Maryland, the student may request inclusion of graduate credits earned at the University of Maryland. When moving from non-degree to degree-seeking status, Non-Degree-Seeking Students may transfer up to nine (9) graduate credits to the degree program (students admitted as non-degree seeking prior to Fall Term 2017 may transfer up to twelve (12) graduate credits to the degree program), subject to the approval of the Graduate Program.

Master's Students. The transfer coursework from the University of Maryland or from another institution must have been taken within five years of the award of a University of Maryland master's degree for which the student is currently enrolled. Courses older than five years at the time the degree is awarded must be revalidated. More information on course revalidation can be found in the Time Extension policy (p. 1026) section of this catalog.

Doctoral Students. Programs may determine that coursework taken at another institution satisfies any or all pre-candidacy coursework requirements. In such cases, transfer of credit is not required.

Approval Process:

- The advisor and Graduate Director will need to certify that transfer courses are applicable to the student's program and, for non-University of Maryland courses, that the courses have been validated (i.e., cover the same content as similar courses at the University of Maryland).
- A student seeking acceptance of transfer credit is advised to submit the necessary transcripts and certification of program approval to the Graduate School as promptly as possible for its review and decision. It should be noted that programs may impose more stringent requirements and time limitations concerning the transfer of credits. In such cases the Graduate School must be notified accordingly.

  A form for Transfer or Inclusion of Credit is available online on the Graduate School's Forms web page (https://gradschool.umd.edu/forms/).

Satisfactory Progress

The admission of all graduate students is continued at the discretion of the Graduate Director of the program and the Dean of the Graduate School, consistent with the policies and practices of the Graduate School and graduate program. A student must make satisfactory progress in meeting programmatic requirements, must demonstrate the ability to succeed in his or her course of studies or research, and must attain performance minima specified by the graduate program in all or in particular courses; otherwise his or her enrollment will be terminated. Determinations of satisfactory progress occur at the graduate program level. Please contact the Graduate Director for conditions for satisfactory progress.

Graduate Student Parental Accommodation Policy

The University of Maryland Graduate Student Parental Accommodation Policy provides a period of up to six (6) weeks during which new parents may postpone completion of academic requirements. It is intended to provide graduate students with an opportunity to integrate the challenges of new parenthood with the demands of graduate-level training, scholarship, and research. In addition to providing support to young families, this policy seeks to reduce attrition and improve time to degree for students who become parents.

The Parental Accommodation Policy is not a leave of absence. This policy allows students to maintain status as full-time, registered graduate students, and thus be eligible for the rights and privileges of registered students (e.g., access to University resources) while adjusting to their new familial obligations.

During this parental accommodation period, eligible students will continue to be enrolled as full-time graduate students and will continue to pay tuition and fees. Students also will be expected to keep the lines of communication with their departments open and demonstrate to their advisors that they are academically engaged and making progress in coursework and research, though perhaps at a slower pace.

Eligibility

To be eligible to apply for the benefits of the Parental Accommodation Policy, a new parent must

(1) have been enrolled full-time for at least one full semester in a graduate program at the University,
(2) be enrolled full-time at the time of application,
(3) be in good academic standing, and
(4) be making satisfactory progress toward degree.

Any parent (regardless of gender) is eligible to apply.

In the event that both parents are eligible, each is individually entitled to a Parental Accommodation period of up to six (6) weeks. This Parental Accommodation period may be taken concurrently with or consecutively to the Parental Accommodation period taken by the other parent, with or without some overlap. The total combined Parental Accommodation period for both parents, however, may not exceed 12 weeks and must conclude 12 weeks following the child's birth or adoption.

Accommodation

Approval of a student's application for a period of Parental Accommodation allows the student, assuming the prior agreement of instructors, advisor, and academic program, to modify deadlines and academic expectations to accommodate the student's new parental responsibilities. Students may be able to postpone completion of course assignments, examinations, and other academic requirements for a period of up to six (6) weeks. Students who will be enrolled in courses during the accommodation period must meet with their instructors to develop a written plan as to how they will satisfactorily complete the course(s). These plans must be approved and signed by the instructor(s) and submitted as part of the Parental Accommodation Application form. At the end of the accommodation period, students are expected to return to graduate study and resume progress toward completion of their degree. Deadlines with regard to time to degree, time to candidacy, time to comprehensive or qualifying exams, etc. will be extended one semester per childbirth or adoption, upon the request of the student. The total additional time granted for the extension of any deadlines as a result of the student's use of the Parental Accommodation Policy, however, cannot exceed a maximum period of one (1) year, regardless of the number of births or adoptions, or the number of times the student invokes the Parental Accommodation Policy.

The period of Parental Accommodation begins immediately upon the birth or adoption; must be taken in a consecutive block of time; and cannot extend beyond six (6) weeks. The student may not divide the accommodation period into separate periods or defer the accommodation period beyond this time limit. In the event of simultaneous multiple births or adoptions, the maximum Parental Accommodation period for which a student is eligible with respect to that event remains six (6) weeks.

Application

At least eight (8) weeks prior to the anticipated birth or adoption, students must submit a written application for Parental Accommodation signed by the Faculty Advisor, Director of Graduate Studies, and the Chair of their academic department, to the Graduate School. (In unusual or extraordinary circumstances, the Graduate School may accept applications with less than eight week's notice.)

Written plans to complete coursework, signed by the student and the instructor, must be provided for each course in which the student will be enrolled during the accommodation period. The discretion to provide an accommodation that allows a student to be away from the classroom for six weeks rests with the individual course instructor. Faculty are strongly encouraged to work with students to develop an accommodation that permits the student to fulfill academic coursework requirements while benefiting from a period of parental accommodation, and that also maintains fairness with regard to other students. In some cases such an accommodation may not be feasible. In such cases, faculty should provide a written explanation to the department's Director of Graduate Studies as to why the accommodation is not possible, and students should adjust their class schedules accordingly.

The Dean of the Graduate School will review the request and notify the student and the student's academic program if the request for a period of Parental Accommodation has been approved. The Graduate School will coordinate with academic programs to make appropriate adjustments to the student's deadlines and records. Retroactive requests will not be considered. A copy of the application form is attached.

International students should discuss plans with the Office of International Students & Scholar Services as soon as possible in order to identify and address proactively any individual or unique visa issues and/or to consider the latest applicable regulations. The intent of this policy is to permit all students to maintain their status as full-time, enrolled students during this period of accommodation. Medical complications, prior to or following the birth, are not covered by this policy. If a student is not able to return at the end of the period of accommodation, s/he should consider applying for a Leave of Absence. See the Graduate School's Registration Policies (http://pdc-webapp-lamp27.umd.edu/Catalog/policy.php?registration-policies) for more information.

Good Standing

In order to maintain good academic standing, every graduate student must maintain a cumulative grade point average (GPA) of 3.0 for all courses taken at the University.

Academic Probation and Dismissal

A student whose cumulative grade point average falls below 3.0 will be placed on academic probation by the Graduate School. When a student is placed on probation, the Graduate School will notify both the student and the Graduate Director of the student's program. Permission of the academic advisor and the Graduate Director will be required for a student on probation to register for courses. Probation will be lifted when the student achieves a cumulative GPA of 3.0.

A student who has completed fewer than 12 credit hours and has a cumulative grade point average below 3.0 in the first term (semester or 12-week) will receive a warning. A student who has completed 12 credit hours or two or more terms (semester or 12-week) and whose cumulative grade point average is below 3.0 will be placed on probation and have one term (semester or 12-week) to raise their grade point average 3.0 or higher or be dismissed from the Graduate School. If the grade point average cannot be raised to 3.0 in that term, the student will be prevented from registering and will be immediately dismissed from the Graduate School.

Time Limitations

Time Limitations for Master's Degrees and Certificates

With the exception of the six credit hours of graduate level course credits applicable for possible transfer to the master's degree and certificate programs, all requirements for the master's degree or graduate certificate must be completed within a five-year period. Time taken for an approved Leave of Absence for Childbearing, Adoption, Illness or Dependent Care does not count toward this five-year limit.

Time Limitations for Doctoral Degrees

Students must advance to candidacy within five years of admission to the doctoral program. Students must complete the entire program for the doctoral degree, including the dissertation and final examination, during a four-year period after admission to candidacy. Under certain circumstances, time extensions may be granted by the Graduate School as outlined below. Admission to the degree program terminates if the requirements are not completed in the time specified. Time taken for an approved Leave of Absence for Childbearing, Adoption, Illness or Dependent Care is not counted in these time limitations.

Time Extensions

MASTER'S DEGREE AND CERTIFICATE STUDENTS

A student who has failed to complete all requirements by the prescribed deadlines may petition his or her graduate program for a one-year extension of time in which to complete the outstanding requirements. This extension may be granted by the graduate program, which must then notify the Graduate School in writing of its decision. The Graduate School will confirm this decision in writing to the student.

A student who has failed to complete all requirements for the degree following the granting of an initial time extension by his or her graduate program, and who wishes to pursue the degree, must seek an additional extension by petitioning the graduate program. If the graduate program supports the request, the request must be forwarded to the Graduate School for review with a letter of support from the Graduate Director that includes a statement that the graduate program has approved the request. Departmental approval may be either a vote of the department as a whole or of a committee designated to deal with such matters, such as the Graduate Committee. The letter must include a time table listing specific goals to be accomplished at various points during the extension period.

The letter should also include a request for revalidation of courses that will be more than five years old at the time of graduation. Revalidation establishes that a course taken more than five years ago would, in combination with other courses taken, satisfy the learning objectives of the current degree program. Full members of the program's graduate faculty should vote unanimously to revalidate courses taken more than five years ago. Once unanimously approved, these courses will satisfy the requirements for the degree. Typically, this extension will be for a maximum of one year. The Graduate School 's decision will be communicated in writing to the petitioner and a copy will be sent to the student's graduate program. Credits transferred at the start of a degree program do not need to be revalidated when a student completes all requirements for a degree.

DOCTORAL STUDENTS

Extensions of time for doctoral students must be requested from the Graduate School by the doctoral program. The first request for an extension of the deadline for admission to candidacy or completion of the doctoral dissertation requires a letter of support from the Graduate Director. The letter must include a timetable listing specific goals to be accomplished at various points during the extension period. Normally, the extension will be for a maximum of one year.

The request for a second extension requires a letter of support from the Graduate Director that includes a statement that the graduate program has approved the request. Departmental approval may be either a vote of the department as a whole or of a committee designated to deal with such matters, such as the Graduate Committee. The letter must include a timetable that lists specific goals to be accomplished at various points during the extension period. Typically this extension will be for a maximum of one year.

Requests for a third extension will be honored **only in rare instances** when serious and unforeseen circumstances that are not covered under the Leave of Absence for Childbearing, Adoption, Illness or Dependent Care policy have interfered with the student's normal progress toward the degree. The request for a third extension requires a letter of support from the Graduate Director that includes a statement that the program has approved the request. The letter must include a timetable listing specific goals to be accomplished at various times during the extension period. Typically, this extension will be for a maximum of one year. The third extension is the final extension. **Additional extensions will not be approved by the Graduate School.**

In the event that a graduate program wishes to continue a student in the program beyond a third extension, the following procedures must be followed:

- The student must apply to be readmitted to the graduate program. The application must be accompanied by a letter of support from the Graduate Director, which indicates the approval of the program for the readmission.
- The Graduate Director's letter must include a timetable listing specific goals to be accomplished at various points during the re-admission period.
- Doctoral students must be advanced to candidacy within one year of re-admission. No extensions will be given for this deadline.
- Doctoral students who have previously advanced to candidacy and who apply for readmission and re-advancement to candidacy must demonstrate that their knowledge is current and consistent with those standards that are in effect in the graduate program at the time that the re-advancement to candidacy is made. The program will determine what constitutes an acceptable level of current knowledge on a case-by-case basis and must include this determination in its recommendation for readmission. This could mean that the student will be required to retake the comprehensive examination or otherwise demonstrate that the student's knowledge is consistent with current standards of the graduate program.
- Re-admitted students who have been advanced to candidacy will be allowed four years to complete the dissertation. No extensions will be given after this deadline.

Master's Degree Policies

Approved Program

The entire course of study undertaken for any master's degree must constitute a unified, coherent program that is approved by the student's advisor and Graduate Director and meets Graduate School requirements.

Credit Hours

A minimum of thirty credit hours in courses acceptable for credit towards a graduate degree is required. At least 12 of those credits must be earned in the major subject approved by the graduate program in which the student is enrolled.

For a master's degree with the thesis option, a minimum of 12 credit hours of coursework at the 600 level and above is required in addition to at least six credit hours of thesis research (799). No more than six credit hours of thesis research may count towards satisfaction of the minimum degree requirements.

For the master's degree with the non-thesis option, a minimum of 18 credit hours in courses numbered 600 and above is required, as well as one or more scholarly papers, some portion of which must be written. In many cases, successful completion of comprehensive examinations is required by the program.

Coursework Level

The graduate program must include at least 12 hours of course work at the 600 level or higher; no fewer than 12 hours of course work credit must be earned in the major subject approved by the graduate program in which the student is enrolled.

Residence Credit

A minimum of 50% of the credit hours required for the degree must be completed as a University of Maryland graduate student, either on the College Park campus or at an approved University of Maryland instructional site. Courses completed in University of Maryland graduate certificate program(s) would be considered residency courses upon admission to a University of Maryland degree program. For more information on courses acceptable for credit towards a University of Maryland graduate degree, please review the Academic Record policies (p. 1022) section of this catalog.

Prerequisites

If a student is inadequately prepared for the required graduate courses, additional courses may be deemed necessary; such courses will not be considered part of the student's approved program of study.

Single Credit Application

Credits to be applied to a student's program for a master's degree cannot have been used to satisfy any other previously earned degrees (see policies governing the applicability of previously taken courses to University of Maryland degrees).

Graduate School Requirements for the Degrees of Master of Arts and Master of Science

A thesis must be submitted for the Master of Arts or Master of Science degrees except for those programs for which a non-thesis option has been approved by the Graduate Council. Approval of the thesis is the responsibility of a nominated and approved Examining Committee. The advisor is normally the chairperson of the committee, and the remaining members of the committee are members of the Graduate Faculty who are familiar with the student's program of study.

Research Assurances

Human Subject Research

Everyone at the University of Maryland who is conducting research that involves human subjects must obtain approval in advance from the Institutional Review Board (IRB). The IRB is charged with approving the initiation of research involving human subjects and conducts periodic reviews of that research to ensure that all projects comply with Federal regulations. These regulations are strict and the Graduate School urges all graduate students to consult with the IRB before beginning any research on living subjects. For application forms and guidelines on such issues as research involving minors or prisoners, surveys, and the use of audio taping, videotaping, digital recordings and photographs, please see the Institutional Review Board's website (http://www.umresearch.umd.edu/IRB/).

Other Research

If the thesis research involves the use of vertebrate animals, animal use protocols must be approved in advance by the Institutional Animal Care and Use Committee of record. If the thesis research involves hazardous materials, either biological or chemical, or recombinant RNA/DNA, the research must be approved by the appropriate University committee. These research assurances must be approved prior to the initiation of any thesis-related research, and the approvals must be provided to the Graduate School at the time the student submits the Nomination of Examining Committee form.

The Master's Thesis Examination

A final oral examination of the thesis will be held when the student has completed the thesis to the satisfaction of the student's advisor, all other requirements for the degree have been completed, and a 3.0 grade point average (computed in accordance with the regulations described under "Grades for Graduate students") has been earned.

Establishment of the Thesis Examining Committee

The Thesis Examining Committee is appointed by the Dean of the Graduate School, in accordance with the policies listed below:

- **Eligibility**. A student is eligible to be examined on a thesis if the student:
  a. has met all program requirements for a thesis examination,
  b. is in good standing as a graduate student at the University,
  c. is registered for at least one credit,
  d. has a nominated and approved Thesis Examining Committee,
  e. has at least a 3.0 grade point average, and
  f. if this is the second examination, the examination has been approved by the Graduate School.
- **Thesis Examining Committee Membership.** The Committee will include a minimum of three members of the Graduate Faculty, at least two of whom will be Full Members. The Chair of the Committee normally will be the student's advisor, who will be a Full or Associate Member of the Graduate Faculty, or who has been granted an exception to the policy by the Dean of the Graduate School.
- **Membership on a Thesis Examining Committee.** Requires nomination by the student's advisor and Graduate Director in the student's graduate program, and approval by the Office of the Registrar. The nomination of a Thesis Examining Committee should be submitted at least six weeks before the date of the expected thesis examination. The thesis examination cannot be held until the composition of the Thesis Examining Committee is approved. Furthermore, if the Graduate Faculty status of any member of an approved Thesis Examining Committee changes, the approval of the Thesis Examining Committee may be voided, and a new Committee nomination form will be required for approval.
- **Chair.** The Thesis Examining Committee will have as chair the student's advisor, who must be a Full or Associate Member of the Graduate Faculty or, by special permission, has been otherwise appointed by the Dean of the Graduate School. Thesis Examining Committees may have co-chairs.

Procedures for the Oral Examination

Oral Examination Requirement. Each master's thesis student must defend orally their master's thesis as a requirement in partial fulfillment of the master's degree (an additional comprehensive written examination may be required at the option of the program.)

- **Committee Preparation.** The members of the Thesis Examining Committee must receive the thesis at least seven working days before the scheduled examination. Should the Thesis Examining

Committee deem it reasonable and appropriate, it may require submission of the thesis more than seven working days in advance of the examination.

- **Attendance at the Examination.** Oral examinations must be attended by all members of the student's officially established Thesis Examining Committee as approved by the Office of the Registrar. All examinations must be open to members of University of Maryland Graduate Faculty. Programs may wish routinely to open thesis examinations to a broader audience. In such cases, program policies must be established, recorded, and made available to all master's students. Should a last-minute change in the constitution of the Thesis Examining Committee be required, the change must be approved by the Dean of the Graduate School in consultation with the program's Graduate Director and the chair of the student's Thesis Examining Committee.
- **Remote Participation in Examinations**. All questions related to remote defenses should be sent to graduate-dean@umd.edu. Under normal circumstances, all members of a Thesis Examining Committee must be physically present in the examination room during the entire defense and during the committee's private deliberations following the examination. Participation by telephone is not permitted under any circumstances. Remote participation by video teleconferencing is permitted under the following circumstances:
  - Permission to conduct a remote-participation defense must be obtained by the thesis chair from the Graduate School in advance. In making this request, the chair must indicate in writing that they have read the rules for a remote defense listed below.
  - Video conferencing software must be used that allows all participants to see and hear each other during the entire defense.
  - The candidate and the committee chair (or at least one of the co-chairs) must all be present in the examination room; none may be at a remote site except for under highly unusual circumstances that restrict travel or in-person participation.
  - If necessary, other members of the committee may participate from one or more remote sites as long as the conferencing software supports the rules of conduct of the defense. Permission for remote participation must be approved in advance by the Dean of the Graduate School. The request for remote participation must provide a compelling reason and/or explanation as to why each remote committee member cannot be physically present.
  - The remote participants must connect to the defense in a manner that will ensure that all participants are visible and audible and that the connection is stable and available throughout the scheduled time of the defense. Remote participation must occur from a private and quiet location that is free of distractions and under conditions that allow remote participants to be fully attentive.
  - The committee chair is responsible for ensuring that all requirements for remote participation are met, that the remote participation was uninterrupted, and if interrupted, that the defense was paused until all remote participants were fully restored.
  - Units can opt to offer online synchronous viewing options even when all committee members are in-person, with the defending student's consent.
- **Location of the Examination.** Oral examinations of theses must be held in University facilities that are readily accessible to all members of the Thesis Examining Committee and others attending the examination. The chair of the Thesis Examining Committee selects the time and place for the examination and notifies the other members of the committee and the candidate.
- **Emergency Substitution Procedure**. Last-minute emergencies can prevent a committee member from attending a scheduled thesis examination. The Graduate School will work with the chair of the examining committee and/or the Director of Graduate Studies to make last-minute substitutions in committee membership to allow the examination to take place as scheduled.
  - The request must be sent in writing via email to the Dean of the Graduate School. A telephone call to the Graduate School explaining that an emergency request is coming will facilitate the process.
  - The proposed substitute must be a member of the Graduate Faculty consistent with the rules for committee membership. Thus, if the Dean's Representative (who must be a tenured faculty member) could not attend, the substitution of an untenured member of the Graduate Faculty would not be acceptable.
  - Once the written request has been received, the substitution will be made, usually within the hour, provided that the revised committee meets the requirements for committee membership.
  - When the substitution has been made, a written confirmation via email will be sent, along with a telephone confirmation. The substitution is not official, however, until the written confirmation has been received in the graduate program. A copy of the written request and the written confirmation must be placed in the student's file for future reference.
  - An examination that is held with one or more substitute members on the committee, but without prior written confirmation from the Graduate School that the substitution(s) have been approved, will be voided and the examination will have to be repeated.
- **Invalidation of the Examination.** The Dean may void any examination not carried out in accordance with the procedures and policies of the Graduate School. In addition, upon the recommendation of the Thesis Examining Committee or any member thereof, the Dean of the Graduate School may rule an oral examination to be null and void.
- **Conclusion of the Examination.** After the oral examination, the student and any others who are not members of the Thesis Examining Committee will be asked to leave the room and the Thesis Examining Committee will discuss whether or not the thesis (including its examination) has been satisfactory. The Committee has the following options:

  a. To accept the thesis and the oral defense without any recommended changes and sign the Report of the Examining Committee.

  b. To accept the oral defense, but recommend substantive revisions to the thesis and, except for the chair, sign the Report of the Examining Committee. The chair will provide the committee and

student with a list of the required revisions. The chair will check that the changes to the thesis have been made, and, upon their approval, sign the Report of the Examining Committee.

c. To recommend major revisions to the theses and/or to deem the oral defense deficient. In this case, the committee would reconvene a closed meeting of only the Thesis Examining Committee and the student to complete the student's examination. The chair will provide the committee and student with a list of the required significant revisions to the thesis and/or deficiencies in the oral defense. The chair also will inform the program's Director of Graduate Studies and the Dean of the Graduate School of the required revisions/deficiencies and the timeline for reconvening the Examining Committee. During the reconvened meeting, committee members' questions will focus on the revisions to the thesis and/or the deficiencies in the prior oral defense. Ordinarily, the reconvened meeting of the Thesis Examining Committee will occur within two months after the initial meeting oral defense.

d. To rule the thesis (including its examination and oral defense) unsatisfactory. In that circumstance, the student fails. Following the examination, the chair must inform the student of the outcome of the examination. The committee chair must sign the Report of the Examining Committee, including a statement explaining why the thesis was deemed unsatisfactory. A copy of this statement must be included in the student's file at the graduate program office, and a copy is given to the student. This statement must be submitted to the program's Graduate Director, the Dean of the Graduate School, and the student.

- **Passage or Failure.** The student passes if all members of the Thesis Examining Committee accept the thesis (including its examination) as satisfactory. One or more negative votes constitute a failure of the candidate to meet the thesis requirement. A second examination may be permitted if the student will be in good standing at the time of the proposed second examination. A second examination requires the approval of the program's Graduate Director and the Dean of the Graduate School. If the student fails this second examination, or if a second examination is not permitted, the student's admission to the graduate program is terminated.
- **The Decision to Accept the Examination as Satisfactory Must Be Unanimous**. Students may present themselves for examination only twice. The report of the committee, signed by each member, must be submitted to the Dean of the Graduate School no later than the appropriate date listed in the *Schedule of Classes* if the student is to receive a diploma at the Commencement ceremony for the semester in which the examination is held.

Submission and Publication of the Thesis

Theses are to be submitted to the Graduate School in electronic format after final approval of the document by the Thesis Examining Committee. See the University of Maryland Electronic Thesis and Dissertation (ETD) website (https://www.etdadmin.com/main/home/)or the University of Maryland Thesis and Dissertation Style Guide (http://www.gradschool.umd.edu/current_students/etd_style_guide.html) for the details of this process.

Theses submitted to the University through the ETD process will also be deposited in the UM Library's online electronic archive, DRUM (Digital Repository at the University of Maryland) (http://drum.lib.umd.edu). This is a free public archive of academic work by University faculty and graduate students. The submission of the thesis to the University in fulfillment of degree requirements grants the University the one-time, non-exclusive right to publish the document on DRUM.

The University's Rights

The University of Maryland retains non-exclusive distribution, reproduction, and archival rights to theses and doctoral dissertations submitted to the Graduate Faculty in fulfillment of requirements for a graduate degree. Such rights entitle the University of Maryland to reproduce, archive, and distribute theses and dissertations, in whole or in part, in and from an electronic format, as it sees fit. Distribution is subject to a release date stipulated by the student and approved by the University.

THE STUDENT'S RIGHTS AND RESPONSIBILITIES

As the owner of copyright in the thesis or dissertation, students have the exclusive right to reproduce, distribute, make derivative works based on, publicly perform and display their work, and to authorize others to exercise some or all of those rights. As a condition of graduation, each student's thesis or dissertation must be published to support the university's mission of advancing knowledge as a public institution. When students submit their work to the Graduate School, they will be given several options regarding access to their document via ProQuest's Digital Dissertations and DRUM, the Digital Repository at the University of Maryland. The student's options are:

- **Making the thesis or dissertation available via ProQuest and DRUM as soon as it is received.** The abstract and full text of your work will be present in ProQuest's Digital Dissertations for purchase, and will be both freely available and searchable online via DRUM.
- **Automatically restrict online publication of the thesis or dissertation for two years.** Students may place an embargo (a restriction) of two years on electronic access to your document through ProQuest's Digital Dissertations and DRUM . Should a student elect to restrict online publication of their work, a description of the research, including the student's name, the document's title, the advisor's name (or advisors' names), and the abstract will be available via ProQuest and DRUM, but the actual electronic file will be unavailable for viewing or download until the selected embargo period has passed. This embargo option does not require special permission, but students should discuss this option with their advisor(s) in advance of deciding whether to place a two-year embargo on their work
- **Request an online publication restriction of the thesis or dissertation for up to six years.** Students may request an embargo (a restriction) of up to six years on electronic access to their document through ProQuest's Digital Dissertations and DRUM if there is legitimate reason to do so. Should the work be restricted online for up to six years, a description of the research, including the student's name, the document's title, the advisor's name (or advisors' names), and the abstract will be available via ProQuest and DRUM, but the actual electronic file will be unavailable for viewing or download until the selected embargo period has passed. This embargo request requires written approval of the Dean of the Graduate School. Students must complete this form (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/umd_embargo_request_form_12-2021_0.pdf), which includes attaching a letter co-signed by the student and their advisor(s). The letter should briefly justify the request, including a strong rationale for the extended embargo and the specific amount of embargo time requested. In rare circumstances, such time is necessary (e.g.,

extended patent reviews, publishing monographs, ongoing legal cases related to the project's research, etc.). If a student previously embargoed their work for two years, they can only request an additional four-year embargo. Extensions beyond six years will not be considered except for highly extenuating circumstances (e.g., prolonged illness or caretaking responsibilities, long work deployment that precluded focusing on publication, ongoing legal cases related to the research that prohibit publication, etc.).

- **Request an indefinite online publication restriction of the thesis or dissertation.** In extremely rare cases, students may request an indefinite embargo (a restriction) on electronic access to their document through ProQuest's Digital Dissertations and DRUM. In this case, a description of the thesis or dissertation, including the student's name, the work's title, the advisor's name, and the abstract will be available via ProQuest's Digital Dissertations and DRUM, but the actual electronic file will be embargoed indefinitely. This embargo request requires written approval of the Dean of the Graduate School. Students must complete this form (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/umd_embargo_request_form_12-2021_0.pdf), which includes attaching a letter co-signed by the advisor and student. The letter should briefly justify the request. Indefinite embargoes can be placed only in service of a public good (e.g., for national security reasons). This restriction can be lifted at the request of the student at a later date.

Inclusion of One's Own Previously Published Materials in a Thesis or Dissertation

A graduate student may, upon the recommendation of the thesis director, and with the endorsement of the home graduate program Graduate Director, include his or her own published works as part of the final thesis. Appropriate citations within the thesis, including where the work was previously published, are required. All such materials must be produced in standard thesis format.

It is recognized that a graduate student may co-author work with faculty and colleagues that should be included in a thesis. In such an event, a letter should be sent to the Dean of the Graduate School certifying that the student's Examining Committee has determined that the student made a substantial contribution to that work. This letter should also note that inclusion of the work has the approval of the thesis advisor and the Graduate Director. The format of such inclusions must conform to the standard thesis format. A foreword to the thesis, as approved by the Examining Committee, must state that the student made substantial contributions to the relevant aspects of the jointly authored work included in the thesis.

Inclusion of Copyrighted Materials in a Thesis or Dissertation

Students are responsible for ensuring that their thesis or dissertation complies with copyright law. Copyright law gives the owner of a work exclusive rights to reproduce, distribute, display or perform the work publicly and to modify or adapt the work and the exclusive right to grant others permission to exercise any of those rights in the work, *subject to certain exceptions*. Students are responsible for determining if their use of another's work requires his or her permission or falls within one of the exceptions. Permission is not required to use a work when:

- The work never qualified for copyright because, for example, it lacked originality or was created by Federal employees in the scope of employment.
- Copyright in the work has expired.
- The use qualifies as a fair use.

Students should consult the following documents for guidance on complying with copyright law:

Did the work ever qualify for copyright protection?

- Library of Congress, Copyright Basics (http://www.copyright.gov/circs/circ01.pdf)
- Library of Congress, Ideas, Methods, or Systems (http://www.copyright.gov/circs/circ31.pdf)
- Library of Congress, Blank Forms and Other (http://www.copyright.gov/circs/circ32.pdf)Works Not Protected by (http://www.copyright.gov/circs/circ32.pdf)Copyright (http://www.copyright.gov/circs/circ32.pdf) and Copyright Protection Not Available for Names, Titles, or Short Phrases (http://www.copyright.gov/circs/circ34.pdf)

Has copyright in the work expired?

- Library of Congress, Duration of Copyright (http://www.copyright.gov/circs/circ15a.pdf)
- Cornell University, Copyright Term and the Public Domain in the United States (http://copyright.cornell.edu/resources/publicdomain.cfm)

Is the proposed use a "fair use"?

- Library of Congress, Can I Use Someone Else's Work? (http://www.copyright.gov/help/faq/faq-fairuse.html)
- University of Washington Copyright Connection, Fair Use (http://depts.washington.edu/uwcopy/Copyright_Law/Fair_Use/)

Corrections to Theses and Dissertations

Once submitted to the Digital Repository at the University of Maryland (DRUM (https://drum.lib.umd.edu/)), the body of a thesis or dissertation may not be changed. Students may, however, request that a dated addendum be appended to their original thesis or dissertation document.

To add an addendum, students must submit:

- A written request to the Graduate School (gradschool@umd.edu) to add an addendum to the thesis or dissertation document currently in DRUM.
- The request should include the proposed addendum and a letter of support from the thesis or dissertation chair. The letter of support should confirm that the addendum does not substantively change the content of the document and that all members of the thesis or dissertation committee are aware of the submitted addendum.
- For corrections that arise from the process to review concerns under the the University's policy on scholarly misconduct (https://policies.umd.edu/assets/section-iii/III-110A.pdf), the Graduate School will collaborate with the Office of Faculty Affairs on the proper resolution before a thesis or dissertation addendum will be posted. Thesis and dissertation chairs, committee members, and

students must adhere to the policy's reporting requirements if there is a concern that a thesis or dissertation may require correction as a result of such misconduct.
- With the written approval from the Graduate School, the thesis or dissertation author should send the proposed addendum and Graduate School approval to the Libraries (drum-help@umd.edu) to upload the addendum.

Students who wish to add an addendum to their document on the ProQuest Dissertations and Theses Global Database must contact ProQuest directly at disspub@proquest.com for procedures and fees.

Non-Thesis Option

For programs offering a non-thesis option, please see the individual program's website.

Master of Professional Studies

The Master of Professional Studies is designed to allow campus units the flexibility to propose multidisciplinary degree or certificate programs suited to the needs of employees of government or private sector organizations.

The Master of Professional Studies must meet all University of Maryland admissions and degree requirements for the non-thesis master's degree. All courses included in the master's degree or certificate must be approved graduate courses. Offering a course in the program requires the approval from the Department Chair under whose auspices the course is offered. All faculty who teach the courses must be members of the Graduate Faculty.

The 30-credit Master of Professional Studies Degree has the following components:

- A core of at least four courses usually drawn from a current master's degree program.
- Concentrations and electives drawn from a variety of academic unit course offerings to create a coherent multidisciplinary master's degree program.

ACADEMIC OVERSIGHT AND ADMINISTRATION

The oversight committee should be composed of a full member of the graduate faculty from the "core" area who will serve as the Graduate Director, a second member of the graduate faculty, a representative from the Graduate School, and an administrative manager. Both the Graduate Director and second faculty member must have the approval of their respective department chairs. This committee will provide the academic and administrative oversight for the duration of the degree or certificate program.

Early consultation with the Office of the Associate Provost for Academic Planning and Programs and with the Graduate School is strongly recommended to identify any potential challenges and to ensure expedient progress through the approval process. The Graduate School will be the academic home for the Master of Professional Studies and will hold academic oversight responsibility. Academic units may choose to develop and administer their own program or apply to the Office of Extended Studies for these services.

For information about any one of the Professional Master's Program, please visit the graduate programs page (http://pdc-webapp-lamp27.umd.edu/Catalog/public-programs.php).

Doctor of Philosophy Degree Policies

Purpose

The Doctor of Philosophy Degree is granted only upon sufficient evidence of high attainment in scholarship and the ability to engage in independent research. It is not awarded for the completion of course and seminar requirements no matter how successfully completed.

Credit Requirements

The Graduate School requires that every student seeking the Ph.D. or D.M.A. satisfactorily complete a minimum of 12 semester hours of doctoral dissertation research credits. In most cases this requirement is satisfied by two semesters (fall/spring) of post-candidacy registration, in which the candidate is automatically registered for six credits of Doctoral Dissertation Research (899) per semester. In exceptional cases, in which a student is able to defend the dissertation before completing 12 credits of 899, this requirement can be satisfied by completing a combined total of 12 credits of 898 (pre-candidacy dissertation research) and 899.

A student seeking an Ed.D. must satisfactorily complete a minimum of six semester hours of dissertation credits. The number of research and other credit hours required in the program varies with the degree and program in question.

Advancement to Candidacy

Preliminary examinations, or such other substantial tests as the graduate programs may elect, are prerequisites for advancement to candidacy. A student must be admitted to candidacy for the doctorate within five years after admission to the doctoral program. It is the responsibility of the student to submit an application for admission to candidacy when all the requirements for candidacy have been fulfilled. Applications for admission to candidacy are made by the student and submitted to the graduate program for further action and transmission to the Graduate School. Application forms may be obtained at the Graduate School, Room 2123, Lee Building, or on the web. Applications must be received by the Graduate School prior to the 25th day of the month in order for the advancement to become effective the first day of the following month.

Doctoral candidates are automatically registered for six (6) credits of Doctoral Dissertation Research (899), for which they pay the flat candidacy tuition.

Research Assurances

Human Subject Research

Everyone at the University of Maryland who is conducting research that involves human subjects must obtain approval in advance from the Institutional Review Board (IRB). The IRB is charged with approving the initiation of research involving human subjects and conducts periodic reviews of that research to ensure that all projects comply with Federal regulations. These regulations are strict, and the Graduate School urges all graduate students to consult with the IRB before beginning any research involving living subjects. For application forms and guidelines on such issues as research involving minors or prisoners, surveys, and the use of audio taping, videotaping, digital recordings, and photographs, please see the Institutional Review Board's website (http://www.umresearch.umd.edu/IRB/).

Other Research

If the dissertation research involves the use of vertebrate animals, animal use protocols must be approved in advance by the Institutional Animal Care and Use Committee of record. If the dissertation research involves hazardous materials, either biological or chemical, or recombinant RNA/DNA, the research must be approved by the appropriate University committee. These research assurances must be approved prior to the initiation of any dissertation-related research, and the approvals must be provided to the Graduate School at the time the student submits the Nomination of Examining Committee form.

The Doctoral Dissertation and Examination

A dissertation is required of all candidates for a Doctor of Philosophy degree. The Graduate School has established the following procedures for the conduct of the doctoral dissertation examination.

- **The Dissertation.** The ability to do independent research must be demonstrated by an original dissertation on a topic approved by the graduate program in which the student is earning the degree. The dissertation is not required for professional doctorates.
- **Eligibility.** A student is eligible to defend a dissertation if the student (a) has advanced to candidacy, (b) has met all program requirements for a dissertation examination, (c) is in good standing as a graduate student at the University, (d) is registered for at least one credit, (e) has a valid Graduate School-approved Dissertation Examining Committee, and (f) if this is the second examination, the examination has been approved by the Graduate School.
- **Dissertation Examining Committee Membership.** The Committee must include a minimum of five members of the Graduate Faculty, at least three of whom must be Full Members. The Chair of the Committee normally will be the student's advisor, who will be a Full Member of the Graduate Faculty, or who has been granted an exception to the policy by the Dean of the Graduate School. Each Committee will have appointed to it a representative of the Dean of the Graduate School. The Dean's Representative may be one of the five voting members. Alternatively, the Dean's Representative may not be a voting member of the Committee. Whether the Dean's Representative votes or not is a decision made by the student, primary advisor, and the Dean's Representative before the Dean's Representative is nominated for approval by the Dean of The Graduate School. In addition, the Dean will ensure that there are five voting members on the Committee. Therefore, Committees that have a non-voting Dean's Representative must have at least six members (five voting members and the non-voting Dean's Representative.)
- **Nomination of the Dissertation Examining Committee.** Membership on a Dissertation Examining Committee requires nomination by the student's advisor and the Graduate Director of the student's graduate program, and approval by the Dean of the Graduate School. The nomination of a Dissertation Examining Committee should be provided to the Graduate School at least six weeks before the date of the expected dissertation examination. The dissertation examination cannot be held until the Graduate School approves the composition of the Dissertation Examining Committee. Furthermore, if the Graduate Faculty status of any member of an approved Dissertation Examining Committee changes, the approval of the Dissertation Examining Committee may be void, and a new Dissertation Examining Committee nomination form may be required to be approved by the Graduate School.
- **Chair.** Each Dissertation Examining Committee will have a chair, who must be a Full Member of the Graduate Faculty or, by special permission, has been otherwise appointed by the Dean of the Graduate School . Dissertation Examining Committees may be co-chaired by two or more faculty members. At least one of the co-chairs must be a Full Member and the other co-chair can be an Associate or Full Member. Special Members may not co-chair a doctoral dissertation committee unless granted a special exception. Any changes to the chair or co-chair(s) of an approved committee must be submitted at least six weeks before the examination. Following the Emergency Substitution Procedure (https://academiccatalog.umd.edu/graduate/policies/doctoral-degrees-policies/#emergency), last-minute emergency substitutions are permitted under certain conditions.
- **Representative of the Dean of the Graduate School.** Each Dissertation Examining Committee will have appointed to it a representative of the Dean of the Graduate School. The Dean's Representative should have some background or interest related to the student's research. The Dean's Representative must be a tenured member of the Graduate Faculty at the University of Maryland, College Park. The Dean's Representative must be from a tenure home different from that of the student's program, the primary advisor or co-advisors, and the dissertation examining committee chair or co-chairs (if the chairs or co-chairs are not the primary advisor or co-advisors). In the case of multi-disciplinary programs, the Dean's Representative can be a member of the program, as long as they have a different tenure home from that of the primary advisor or co-advisors and the dissertation examining committee chair or co-chairs.

  The person nominated to become the Dean's Representative may serve as a regular member of the student's Doctoral Graduate Committee from the time it is first convened. Alternatively, the person nominated to be the Dean's representative may be added to the Doctoral Graduate Committee at a later date and either take part in some Committee meetings including the qualifying examination, or only join as a Doctoral Dissertation Committee member for the final dissertation defense. In all cases, the Dean's Representative must be present for the full dissertation defense and serve to adjudicate the defense.
- **Associate Members.** Non-tenure track faculty within the University of Maryland who have been approved for Associate Membership in the Graduate Faculty may serve on Dissertation Examining Committees. Associate Members also can co-chair dissertations as long as the chair is a Full Member of the Graduate Faculty. These Associate Members must be in addition to the required three Full Members of the University of Maryland Graduate Faculty. For procedures to nominate an individual for Associate Membership, please refer to the section below on Graduate Faculty.
- **Special Members.** Individuals from outside the University of Maryland who have been approved for Special Membership in the Graduate Faculty may serve on Dissertation Examining Committees. These Special Members must be in addition to the required three Full Members of the University of Maryland Graduate Faculty. Special members cannot direct or co-direct dissertations. For procedures to nominate an individual for Special Membership, please refer to the section (https://academiccatalog.umd.edu/graduate/policies/faculty-members/) on Graduate Faculty.
- **Service of former University of Maryland faculty members.** Graduate Faculty who terminate employment at University of Maryland (and who do not have emeritus status) retain their status as members of the Graduate Faculty for a twelve-month period following their

termination. Thus, they may serve as members and chairs (but not as Dean's Representatives) of Dissertation Examining Committees during this twelve-month period if they are otherwise eligible. After that time, they may no longer serve as chairs or co-chairs of Dissertation Examining Committees.

- **Professors Emeriti and Associate Professors Emeriti** may serve on Dissertation Examining Committees provided they are members of the Graduate Faculty.

Open Dissertation Examination

The dissertation examination will consist of two parts:

- **Part 1 will be a public presentation by the candidate** on the main aspects of the research reported in the dissertation. During Part 1, questions from the audience to the candidate will be permitted. For questions from persons who are not members of the Dissertation Examining Committee, the Chair of the Dissertation Examining Committee will have discretion to decide whether such questions are germane to the topic of the dissertation and how much time will be allotted for the answers.
- **Part 2 will be a formal examination of the candidate** by the Dissertation Examination Committee. This part will be open only to the Dissertation Examination Committee, other members of the Graduate Faculty, and graduate students from the candidate's graduate program. During Part 2, only members of the Dissertation Examination Committee will be permitted to ask questions. Programs may vote to establish a policy to have Part 2 be open only to members of the Dissertation Examining Committee and members of the Graduate Faculty.
- **Attendance at the final discussion and vote** will be limited to the members of the Dissertation Examining Committee.
- **Announcements of the date, time, and location of the examination**, as well as the candidate's name and the dissertation title, will be disseminated five working days in advance to all members of the Graduate Faculty and graduate students within the graduate program in which the candidate's degree is to be awarded. Mass-distribution methods, such as e-mail, a faculty/student newsletter, or individual announcements are acceptable. Merely posting a paper notice on a corridor bulletin board will not constitute a sufficient announcement.
- Departments and graduate programs may petition the Dean of the Graduate School for exceptions to these policies.

Procedures for the Oral Dissertation Examination

- **Oral Examination Requirement.** Each doctoral candidate is required to defend orally their doctoral dissertation as a requirement in partial fulfillment of the doctoral degree. The oral examination consists of two parts.
    - **Part 1: Student Presentation.** Part 1 will be a public presentation by the candidate on the main aspects of the research reported in the dissertation, emphasizing the important results and giving an explanation of the reasoning that led to the conclusions reached. Questions from the audience to the candidate must be permitted. For questions from persons who are not members of the Dissertation Examining Committee, the Chair of the Dissertation Examining Committee will have discretion to decide whether such questions are germane to the topic of the dissertation and how much time will be allotted for the answers.
    - **Part 2: Formal Examination.** Part 2 will be a formal examination of the candidate by the Dissertation Examination Committee. The chair invites questions in turn from each member of the Dissertation Examining Committee. Only members of the Dissertation Examination Committee will be permitted to ask questions. The questioning may continue as long as the Dissertation Examining Committee feels that it is necessary and reasonable for the proper examination of the student. Part 2 will be open to other members of the Graduate Faculty and graduate students from the candidate's graduate program. Programs may vote to establish a policy to have Part 2 be open only to members of the Dissertation Examining Committee and members of the Graduate Faculty. Opportunity for Questioning by Members of the Dissertation Examining Committee.
    - **Conclusion of the Examination.** After questioning has been completed, the student and any others who are not members of the Dissertation Examining Committee are asked to leave the room while the Dissertation Examining Committee discusses whether or not the dissertation and its defense are satisfactory. The Committee has the following options:

        1. To accept the dissertation and the oral defense without any recommended changes and sign the Report of the Examining Committee.
        2. To accept the oral defense, but recommend substantive revisions to the dissertation and, except for the chair, sign the Report of the Examining Committee. The chair will provide the committee and student with a list of the required revisions. The chair will check that the changes to the dissertation have been made, and, upon their approval, sign the Report of the Examining Committee.
        3. To accept the oral defense, but recommend substantive revisions to the dissertation and not sign the Report of the Examining Committee until the student has made the changes and submitted the revised dissertation for the Dissertation Examining Committee's approval. The chair will provide the committee and student with a list of the required revisions. The Dissertation Examining Committee members sign the Report of the Examining Committee if they approve the revised dissertation.
        4. To recommend major revisions to the dissertation and/or to deem the oral defense deficient. In this case, the committee would reconvene a closed meeting of only the Dissertation Examining Committee and the student to complete the student's examination. The chair will provide the committee and student with a list of the required significant revisions to the dissertation and/or deficiencies in the oral defense. The chair also will inform the program's Director of Graduate Studies and the Dean of the Graduate School of the required revisions/deficiencies and the timeline for reconvening the Examining Committee. During the reconvened meeting, committee members' questions will focus on the revisions to the dissertation and/or the deficiencies in the prior oral defense. Ordinarily, the reconvened meeting of the dissertation committee will occur within two months after the initial meeting oral defense.
        5. To rule the dissertation (including its examination and oral defense) unsatisfactory. In that circumstance, the student fails. Following the examination, the chair, in the presence

of the Dean's Representative, must inform the student of the outcome of the examination. The committee chair and the Dean's Representative both sign the Report of the Examining Committee, including a statement explaining why the dissertation was deemed unsatisfactory. A copy of this statement must be included in the student's file at the graduate program office, and a copy is given to the student. This statement must be submitted to the program's Graduate Director, the Dean of the Graduate School, and the student.

a. A second examination may be permitted if the student will be in good standing at the time of the proposed second examination. A second examination requires the approval of the program's Graduate Director and the Dean of the Graduate School.
b. If the student fails this second examination, or if a second examination is not permitted, the student's admission to the graduate program is terminated unless the student desires to and is eligible to change their degree objective (e.g., to a master's degree in the same program). For more information on changing a degree objective, consult the Policy on Change of Status or Program (https://academiccatalog.umd.edu/graduate/policies/admissions-policies/#:~:text=Any%20subsequent%20requests%20to%20change,approval%20to%20waive%20this%20requirement).

- **Passage or Failure.** The student passes if one member refuses to sign the Report, but the other members of the Dissertation Examining Committee agree to sign, before or after the approval of recommended changes. Two or more negative votes constitute a failure of the candidate to meet the dissertation requirement.
- **Committee Preparation.** The members of the Dissertation Examining Committee must receive the dissertation at least ten working days before the scheduled examination. Should the Dissertation Examining Committee deem it reasonable and appropriate, it may require submission of the dissertation more than ten working days in advance of the examination.
- **Attendance at the Examination.** Oral examinations must be attended by all members of the student's officially established Dissertation Examining Committee as approved by the Dean of the Graduate School. All examinations must be open to all members of the University of Maryland Graduate Faculty. Programs may wish routinely to open dissertation examinations to a broader audience. In such cases, program policies must be established, recorded, and made available to all doctoral students.
- **Emergency Substitution Procedure.** Last-minute emergencies can prevent a committee member from attending a scheduled dissertation examination. The Graduate School will work with the chair of the examining committee and/or the Director of Graduate Studies to make last-minute substitutions in committee membership to allow the examination to take place as scheduled.
    - The request must be sent in writing via email to the Dean of the Graduate School. A telephone call to the Graduate School explaining that an emergency request is coming will facilitate the process.
    - The proposed substitute must be a member of the Graduate Faculty consistent with the rules for committee membership. Thus, if the Dean's Representative (who must be a tenured faculty member) could not attend, the substitution of an untenured member of the Graduate Faculty would not be acceptable.
    - Once the written request has been received, the substitution will be made, usually within the hour, provided that the revised committee meets the requirements for committee membership.
    - When the substitution has been made, a written confirmation via email will be sent, along with a telephone confirmation. The substitution is not official, however, until the written confirmation has been received in the graduate program. A copy of the written request and the written confirmation must be placed in the student's file for future reference.
    - An examination that is held with one or more substitute members on the committee, but without prior written confirmation from the Graduate School that the substitution(s) have been approved, will be voided and the examination will have to be repeated.
- **Date, Time, and Location of the Examination.** Oral examinations must be held in University facilities that are readily accessible to all members of the Dissertation Examining Committee and others attending the examination. The chair of the dissertation examining committee selects the time and place for the examination. Announcements of the date, time, and location of the examination, as well as the candidate's name and the dissertation title, will be disseminated five working days in advance to all members of the Graduate Faculty and graduate students within the graduate program in which the candidate's degree is to be awarded. Mass-distribution methods, such as email, a faculty/student newsletter, or individual announcements are acceptable. Merely posting a paper notice on a corridor bulletin board will not constitute a sufficient announcement.
- **The Dean's Representative.** The Dean's Representative must be identified at the beginning of the examination. The responsibilities of the Dean's Representative include the following: ensuring that the procedures of the oral examination comply with those of the Graduate School (as described herein) and reporting to the Dean of the Graduate School any unusual problems experienced in the conduct of the examination.
- **Invalidation of the Examination.** The Dean of the Graduate School may void any examination not carried out in accordance with the procedures and policies of the Graduate School. In addition, upon recommendation of the Dean's Representative, the Dean may rule an oral examination to be null and void.
- **Remote Participation in a Dissertation Defense.** All questions related to remote defenses should be sent to graduate-dean@umd.edu. Under normal circumstances, all members of a Dissertation Examining Committee must be physically present in the examination room during the entire dissertation defense and during the committee's private deliberations following the examination. Participation by telephone is not permitted under any circumstances. Remote participation by video teleconferencing is permitted under the following circumstances:
    - Permission to conduct a remote-participation defense must be obtained by the dissertation chair from the Graduate School in

advance. In making this request, the chair must indicate in writing that they have read the rules for a remote defense listed below.

- Video conferencing software must be used that allows all participants to see and hear each other during the entire defense.
- The candidate, the committee chair (or at least one of the co-chairs), and the Dean's Representative must all be present in the examination room; none may be at a remote site except for under highly unusual circumstances that restrict travel or in-person participation.
- If necessary, other members of the committee may participate from one or more remote sites as long as the conferencing software supports the rules of conduct of the defense. Permission for remote participation must be approved in advance by the Dean of the Graduate School. The request for remote participation must provide a compelling reason and/or explanation as to why each remote committee member cannot be physically present.
- The remote participants must connect to the defense in a manner that will ensure that all participants are visible and audible and that the connection is stable and available throughout the scheduled time of the defense. Remote participation must occur from a private and quiet location that is free of distractions and under conditions that allow remote participants to be fully attentive.
- The Dean's Representative is responsible for ensuring that all requirements for remote participation are met, that the remote participation was uninterrupted, and if interrupted, that the defense was paused until all remote participants were fully restored.
- Units can opt to offer online synchronous viewing options even when all committee members are in-person, with the defending student's consent.

- **Exceptions.** Departments and graduate programs may petition the Dean of the Graduate School for exceptions to these procedures.

Submission and Publication of the Dissertation

Dissertations are to be submitted to the Graduate School in electronic format after final approval of the dissertation by the Dissertation Examining Committee. See the University of Maryland Electronic Thesis and Dissertation (ETD) website (https://www.etdadmin.com/main/home/)or the University of Maryland Thesis and Dissertation Style Guide (http://www.gradschool.umd.edu/current_students/etd_style_guide.html) for the details of this process.

Dissertations submitted to the University through the ETD process will also be deposited in the UM Library's online electronic archive, DRUM (Digital Repository at the University of Maryland (http://drum.lib.umd.edu)) (http://drum.lib.umd.edu/). This is a free public archive of academic work by University faculty and graduate students. The submission of the thesis to the University in fulfillment of degree requirements grants the University the one-time, non-exclusive right to publish the document on DRUM. The students' and University's rights regarding dissertation and thesis submission and publication are outlined below.

The University's Rights

The University of Maryland retains non-exclusive distribution, reproduction, and archival rights to doctoral dissertations submitted to the Graduate Faculty in fulfillment of requirements for a graduate degree. Such rights entitle the University of Maryland to reproduce, archive, and distribute dissertations, in whole or in part, in and from an electronic format, as it sees fit. Distribution is subject to a release date stipulated by the student and approved by the University.

THE STUDENT'S RIGHTS AND RESPONSIBILITIES

As the owner of copyright in the thesis or dissertation, students have the exclusive right to reproduce, distribute, make derivative works based on, publicly perform and display their work, and to authorize others to exercise some or all of those rights. As a condition of graduation, each student's thesis or dissertation must be published to support the university's mission of advancing knowledge as a public institution. When students submit their work to the Graduate School, they will be given several options regarding access to their document via ProQuest's Digital Dissertations and DRUM, the Digital Repository at the University of Maryland. The student's options are:

- **Making the thesis or dissertation available via ProQuest and DRUM as soon as it is received.** The abstract and full text of your work will be present in ProQuest's Digital Dissertations for purchase, and will be both freely available and searchable online via DRUM.
- **Automatically restrict online publication of the thesis or dissertation for two years.** Students may place an embargo (a restriction) of two years on electronic access to your document through ProQuest's Digital Dissertations and DRUM . Should a student elect to restrict online publication of their work, a description of the research, including the student's name, the document's title, the advisor's name (or advisors' names), and the abstract will be available via ProQuest and DRUM, but the actual electronic file will be unavailable for viewing or download until the selected embargo period has passed. This embargo option does not require special permission, but students should discuss this option with their advisor(s) in advance of deciding whether to place a two-year embargo on their work
- **Request an online publication restriction of the thesis or dissertation for up to six years.** Students may request an embargo (a restriction) of up to six years on electronic access to their document through ProQuest's Digital Dissertations and DRUM if there is legitimate reason to do so. Should the work be restricted online for up to six years, a description of the research, including the student's name, the document's title, the advisor's name (or advisors' names), and the abstract will be available via ProQuest and DRUM, but the actual electronic file will be unavailable for viewing or download until the selected embargo period has passed. This embargo request requires written approval of the Dean of the Graduate School. Students must complete this form (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/umd_embargo_request_form_12-2021_0.pdf), which includes attaching a letter co-signed by the student and their advisor(s). The letter should briefly justify the request, including a strong rationale for the extended embargo and the specific amount of embargo time requested. In rare circumstances, such time is necessary (e.g., extended patent reviews, publishing monographs, ongoing legal cases related to the project's research, etc.). If a student previously

embargoed their work for two years, they can only request an additional four-year embargo. Extensions beyond six years will not be considered except for highly extenuating circumstances (e.g., prolonged illness or caretaking responsibilities, long work deployment that precluded focusing on publication, ongoing legal cases related to the research that prohibit publication, etc.).

- **Request an indefinite online publication restriction of the thesis or dissertation.** In extremely rare cases, students may request an indefinite embargo (a restriction) on electronic access to their document through ProQuest's Digital Dissertations and DRUM. In this case, a description of the thesis or dissertation, including the student's name, the work's title, the advisor's name, and the abstract will be available via ProQuest's Digital Dissertations and DRUM, but the actual electronic file will be embargoed indefinitely. This embargo request requires written approval of the Dean of the Graduate School. Students must complete this form (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/umd_embargo_request_form_12-2021_0.pdf), which includes attaching a letter co-signed by the advisor and student. The letter should briefly justify the request. Indefinite embargoes can be placed only in service of a public good (e.g., for national security reasons). This restriction can be lifted at the request of the student at a later date.

Inclusion of One's Own Previously Published Materials in a Dissertation

A graduate student may, upon the recommendation of the dissertation director, and with the endorsement of the home graduate program's Graduate Director, include his or her own published works as part of the final dissertation. Appropriate citations within the dissertation, including where the work was previously published, are required. All such materials must be produced in standard dissertation format.

It is recognized that a graduate student may co-author work with faculty members and colleagues that should be included in a dissertation. In such an event, a letter should be sent to the Dean of the Graduate School certifying that the student's examining committee has determined that the student made a substantial contribution to that work. This letter should also note that inclusion of the work has the approval of the dissertation advisor and the program chair or Graduate Director. The letter should be included with the dissertation at the time of submission. The format of such inclusions must conform to the standard dissertation format. A foreword to the dissertation, as approved by the Dissertation Committee, must state that the student made substantial contributions to the relevant aspects of the jointly authored work included in the dissertation.

Inclusion of Copyrighted Materials in a Dissertation

Students are responsible for ensuring that their thesis or dissertation complies with copyright law. Copyright law gives the owner of a work exclusive rights to reproduce, distribute, display or perform the work publicly and to modify or adapt the work and the exclusive right to grant others permission to exercise any of those rights in the work, *subject to certain exceptions* . Students are responsible for determining if their use of another's work requires his or her permission or falls within one of the exceptions.

Students should consider the following questions and consult the following documents for guidance on complying with copyright law:

Did the work ever qualify for copyright protection?

- The work never qualified for copyright because, for example, it lacked originality or was created by Federal employees in the scope of employment.
- Copyright in the work has expired.
- The use qualifies as a fair use.
- Library of Congress, Copyright Basics (http://www.copyright.gov/circs/circ01.pdf)
- Library of Congress, Ideas, Methods, or Systems (http://www.copyright.gov/circs/circ31.pdf)
- Library of Congress, Blank Forms and Other (http://www.copyright.gov/circs/circ32.pdf)Works Not Protected by (http://www.copyright.gov/circs/circ32.pdf)Copyright (http://www.copyright.gov/circs/circ32.pdf) and Copyright Protection Not Available for Names, Titles, or Short Phrases (http://www.copyright.gov/circs/circ34.pdf)

Has copyright in the work expired?

- Library of Congress, Duration of Copyright (http://www.copyright.gov/circs/circ15a.pdf)
- Cornell University, Copyright Term and the Public Domain in the United States (http://copyright.cornell.edu/resources/publicdomain.cfm)
- Duke University, Center for the Study of the Public Domain (http://www.law.duke.edu/cspd/)

Is the proposed use a "fair use"?

- Library of Congress, Can I Use Someone Else's Work? (http://www.copyright.gov/help/faq/faq-fairuse.html)
- University of Washington Copyright Connection, Fair Use (http://depts.washington.edu/uwcopy/Copyright_Law/Fair_Use/)

Corrections to Theses and Dissertations

Once submitted to the Digital Repository at the University of Maryland (DRUM (https://drum.lib.umd.edu/)), the body of a thesis or dissertation may not be changed. Students may, however, request that a dated addendum be appended to their original thesis or dissertation document.

To add an addendum, students must submit:

- A written request to the Graduate School (gradschool@umd.edu) to add an addendum to the thesis or dissertation document currently in DRUM.
- The request should include the proposed addendum and a letter of support from the thesis or dissertation chair. The letter of support should confirm that the addendum does not substantively change the content of the document and that all members of the thesis or dissertation committee are aware of the submitted addendum.
- For corrections that arise from the process to review concerns under the the University's policy on scholarly misconduct (https://policies.umd.edu/assets/section-iii/III-110A.pdf), the Graduate School will collaborate with the Office of Faculty Affairs on the proper resolution before a thesis or dissertation addendum will be posted. Thesis and dissertation chairs, committee members, and students must adhere to the policy's reporting requirements if there

is a concern that a thesis or dissertation may require correction as a result of such misconduct.
- With the written approval from the Graduate School, the thesis or dissertation author should send the proposed addendum and Graduate School approval to the Libraries (drum-help@umd.edu) to upload the addendum.

Students who wish to add an addendum to their document on the ProQuest Dissertations and Theses Global Database must contact ProQuest directly at disspub@proquest.com for procedures and fees.

Additional Requirements

In addition to those requirements specified above, each graduate program may impose additional requirements. For these requirements, consult the descriptions that appear under the graduate program listings or the special publications that can be obtained from the graduate programs or colleges.

Foreign Language Requirement

Some graduate programs have a foreign language requirement for the Doctor of Philosophy degree. The student should inquire in the graduate program about this requirement. Students must satisfy the graduate program requirement before they can be admitted to candidacy for the doctorate.

Combined Bachelor's-Master's Programs

In a combined bachelor's/master's program, some graduate level courses initially taken for undergraduate credit may also be applied towards the graduate credit requirements for a master's degree program at the University of Maryland. A bachelor's/master's program may be developed for an individual student, or it may be a structured program. Only graduate programs on the semester term are eligible for the combined degree. Each student can pursue one combined bachelor's/master's program.

Individual Student Bachelor's/Master's Program

An individual bachelor's/master's program may be developed by a current UMD undergraduate student in consultation with his/her academic advisor. Such a program is available only to students whose academic performance is exceptional. It is to be developed according to the individual career interests and goals of the student and should be an integrated learning experience rather than merely the completion of a certain number of graduate and undergraduate credits. The proposed program requires the approval of the Directors of both the undergraduate and the graduate programs involved and of the Dean for Undergraduate Studies and the Dean of the Graduate School . Normally no more than nine credits of graduate courses applied to the bachelor's degree may be counted also for graduate credit in an individual student's program. Courses to be double-counted must be at the 600 level or above and must be passed with at least a "B-" grade. Individual study courses, internships, or courses given as credit by examination are not eligible. The credits to be double-counted will be designated as applicable to the graduate program of study after the student receives the bachelor's degree and matriculates in the Graduate School.

Structured Bachelor's/Master's Program

A structured bachelor's/master's program is a clearly defined curriculum combining an existing University of Maryland (UMD) College Park undergraduate program and an existing master's program at UMD College Park, offered by the same or by different departments. It is designed for students whose academic performance is exceptional and should be an integrated learning experience rather than merely the completion of a certain number of graduate and undergraduate credits. A proposal for such a program should be submitted by the colleges housing the academic programs concerned and requires the approval of the Graduate Council, the Dean of the Graduate School, the Senate PCC Committee, and the President.

Necessary features of a structured bachelor's/master's program include the following:

- Specific requirements that speak to the exceptional performance of the students. At a minimum, students accepted for the program must be clearly admissible to the graduate program portion.
- The program should be designed so as not to unduly delay the completion of the bachelor's degree. Taking graduate credits should not unduly limit the breadth of the student's experience through premature specialization. Where appropriate, graduate courses taken while an undergraduate may substitute for courses required in the undergraduate major program.
- Formal admission to the Graduate School will require completion of all requirements for the bachelor's degree.
- The credits to be double-counted will be designated as applicable to the graduate program after the student receives the bachelor's degree and matriculates in the Graduate School.

A structured bachelor's/master's program may normally include up to nine credits of graduate level courses that are counted both for the bachelor's program and the master's program. More than nine double-counted credits may be allowed if both of the following conditions are satisfied:

- The additional graduate credits applied to the undergraduate program do not unduly limit the breadth of the student's experience through premature specialization.
- The master's program requires more than thirty credits.

Dual Doctoral and Master's Degrees

Graduate students who are enrolled in a doctoral program in one department/program may enroll concurrently for a master's degree in a related area. Examples would be a doctoral student in PHYS enrolling concurrently for a masters in MATH or a doctoral student in ECON enrolling concurrently for a master's in BMGT.

The following rules govern the dual-enrollment process:

- The student must be in good academic standing.
- Both graduate departments/programs must agree to the dual-degree enrollment.
- The full degree requirements must be met in both programs.
- The same course cannot be applied to both programs.
- A written plan for the dual enrollment must be worked out between the two departments/programs regarding credits, advising, semester loads, etc. Copies of this plan must be placed in the student's file in

each program and a copy sent to the Graduate School to be included in the student's records.

- Students must complete the Dual Master's and Doctoral Program form (https://gradschool.umd.edu/forms/) and submit to the Graduate School for final review.

Once the written plan is filed with the Graduate School, the student's doctoral program will be designated as the primary degree and the masters program will be designated as the secondary degree. Students and advisors should bear in mind that our present computer system has no way of knowing towards which degree a given course grade should be applied for purposes of computing the GPA. Therefore, students enrolled in dual-degree programs will only have an overall GPA, which reflects their combined performance in the two programs. We are unable to provide separate GPAs for the masters and doctoral components of the two programs. Students therefore should be advised that poor performance in their masters program would affect their overall GPA as it is calculated on their transcript.

Graduate Certificate Policies

A post-baccalaureate certificate is awarded for the successful completion of a minimum of 12 credit hours of graduate-level work in a defined subject area under the following conditions:

1. The program must include a minimum core requirement of nine credit hours chosen from a limited list as designated by the graduate program.
2. Non-core courses must be chosen from a specific list of acceptable options.
3. No fewer than nine credit hours must be earned at the 600 level and above.
4. In a twelve credit certificate program three credits may be earned at the 400 level; for certificate programs requiring more than 12 credits, a maximum of six credit hours may be at the 400 level.
5. All credits for a certificate must be completed at the University of Maryland.
6. A minimum grade point average of 3.0 is required for the award of a graduate certificate.
7. All requirements for the graduate certificate must be completed within a five-year period.

Courses completed in a post-baccalaureate certificate may count towards a master's degree at the University of Maryland if the following conditions are met:

1. Without prior approval, the certificate courses are not used towards any other post-baccalaureate certificate or master's degree.
2. If the certificate was completed at an institution other than the University of Maryland, no more than 6 transfer credits may be used towards the master's degree.
3. The certificate courses must satisfy existing requirements in the master's degree program. All students in the master's degree program must be eligible to take the certificate degree courses. The learning outcomes for all courses must be the same if different sections of the same courses are offered for a certificate program and a master's program.
4. The master's degree has not yet been conferred.

Additional certificates may apply towards the master's degree if approved by the Graduate Programs, Curricula, and Courses (PCC) Committee. This approval process ensures that the master's degree is cohesive for all students regardless of whether they are admitted directly into the master's program or earn the master's degree through stacking multiple certificates. Please review the Master's Degrees Policies (p. 1026) section of this catalog for more information on master's degree credit requirements.

Current UMD post-baccalaureate certificate students interested in pursuing a UMD master's degree should consult with their prospective master's program department to understand the program's curriculum requirements and admissions timeline. A new admissions application is required to pursue a higher-level degree objective. More information on changing programs can be found in the Admissions Policies (p.) section of this catalog.

Information on active Graduate Certificates can be found on our program listing page (https://academiccatalog.umd.edu/filters/#filter=filter_26).

Graduate School Field Committees

Groups of faculty who are engaged in a common research area that crosses disciplinary or sub-disciplinary lines may seek formal recognition as a Field Committee from the Graduate School. It is assumed that these committees will find ways to sponsor collaborative scholarship by faculty and graduate students through the sponsorship of symposia and lectures, the creation of courses, the direction of graduate student research. The University of Maryland currently recognizes several official Graduate School Field Committees (https://gradschool.umd.edu/international-initiatives/field-committees/).

The Graduate School supports and encourages intellectual exchange and collegiality among the academic fields and disciplines. These exchanges and interactions distinguish the University from a collection of isolated teaching centers and research institutes, produce advancements in knowledge and intellectual synergy, and promote a dynamic curriculum that reflects the current development of research and scholarship. To foster these activities, the Graduate School encourages the formation of interdisciplinary Field Committees. The purpose of these committees is to enhance collaborative research, foster intellectual achievement, use the Graduate School 's resources to support advanced research, elevate the visibility of the University's expertise in interdisciplinary areas, and attract graduate students.

Requirements for Formal Recognition

- A minimum of five Full Members of the Graduate Faculty, representing at least two disciplines or sub-disciplines, must agree to participate.
- The Field Committee faculty must commit to meeting at least twice a semester.
- The Field Committee faculty must keep regular minutes of the meetings.
- The Field Committee faculty must select a spokesperson or convener for the Committee.

Requirements for Offering Courses and Advising Students

- A set of regularly taught graduate courses must be identified in the Field Committee area.
- The department chair of each member of the Committee must agree to the faculty member's participation in the Committee.
- Approved graduate programs must be willing to admit qualified students who express a prior interest in the Committee, and

departments must be willing to consider them for department/ University support in an open competition.

- The spokesperson for the Committee must report each semester to the respective Graduate Program Directors on the progress of graduate students who are affiliated with the Committee.

Available Resources for Field Committees

- The Committee may request financial assistance from the Graduate School for brochures and web site development to advertise and promote the field.
- The Committee may request financial support for speakers, symposia, and other intellectual events from the Graduate School .
- The Committee may request a sum equivalent to the cost of a course buy-out for the development of a new course to be offered in the field. Funds will be available for up to two years. In order to receive Graduate School funds, a department must be willing to support the course at the end of the two-year period if student demand warrants.
- The Graduate School will list the Field Committee in the Graduate Catalog.

The Graduate School will recognize Field Committees for an initial period of five years. At the end of that period, the activities and accomplishments of the Committee will be reviewed. If the Committee members and the Graduate Dean are both satisfied that the Committee is able to foster and enhance intellectual achievements, the Committee's recognition by the Graduate School will be extended for another period of five years, at which point it will be reviewed again. The criteria for each review will be the Committee's accomplishments in enhancing collaborative research and intellectual achievement, and its success in attracting and educating graduate students.

Approved by the Graduate Council on March 15, 2005.

Graduate Faculty Members

Appointment of Graduate Faculty

The Graduate Faculty are responsible for teaching graduate-level courses, designing the academic content of graduate degree programs, and supervising the writing and defense of graduate student research in the form of theses and dissertations.

Graduate Faculty Categories and Qualifications

There are four Graduate Faculty membership categories: Full, Associate, Graduate Teaching, and Special Members.

1. **Full Members:** All tenure-track and tenured faculty and College Park Professors are automatically appointed as Full Members of the Graduate Faculty.

   Full Members are eligible to teach graduate-level courses, direct and serve on graduate program committees, direct master's thesis research, chair master's thesis examining committees, direct doctoral dissertation research, and chair dissertation examining committees. They also can vote and serve on the Graduate Council and its committees.
2. **Associate Members:** Professional-track faculty can be nominated to serve as Associate Members for renewable terms of five years. Associate Members of the Graduate Faculty normally come from the ranks of the following categories in the University of Maryland Policy and Procedures on on Appointment, Promotion, and Tenure of Faculty:
   a. Assistant Research Faculty ranks (assistant research professor, assistant research scientist, assistant research scholar, assistant research engineer);
   b. Associate Research Faculty ranks (associate research professor, associate research scientist, associate research scholar, associate research engineer);
   c. Research Faculty ranks (research professor, research scientist, research scholar, research engineer);
   d. Artist-in-Residence Ranks (assistant artist-in-resident, associate artist-in-residence, artist-in-residence);
   e. Field Faculty (agent associate, senior agent associate, and principal agent associate);
   f. Faculty engaged exclusively or primarily in library service (Librarian 3 and 4); and
   g. Additional faculty ranks as appropriate (Adjunct Assistant Professor, Adjunct Associate Professor, and Adjunct Professor; visiting appointments that correspond to eligible ranks listed above; Professor of the Practice, and University of Maryland Professor).

   Associate members are eligible to teach graduate-level courses, direct and serve on graduate program committees, direct master's thesis research, and chair master's thesis examining committees. They can co-direct doctoral dissertation research and co-chair dissertation examining committees, but they cannot direct doctoral dissertation research or chair dissertation examining committees. They also can vote and serve on the Graduate Council and its committees.
3. **Graduate Teaching Members:** All faculty teaching graduate-level courses must be members of the Graduate Faculty. Professional-track faculty can be nominated to serve as Graduate Teaching Members for renewable terms of five years. Graduate Teaching Members normally come from the ranks of the following categories in the University of Maryland Policy and Procedures on on Appointment, Promotion, and Tenure of Faculty:
   a. Instructor
   b. Assistant Clinical Professor, Associate Clinical Professor, or Clinical Professor; and
   c. Additional faculty ranks as appropriate

   Graduate Teaching Members are eligible to teach graduate-level classes. They cannot direct or serve on graduate program committees, direct or co-direct master's thesis research, chair or co-chair master's thesis examining committees, direct or co-direct doctoral dissertation research, or chair or co-chair dissertation examining committees.
4. **Special Members:** Scholars who have no official affiliation with the University of Maryland can be nominated as Special Members of the Graduate Faculty for renewable terms of five year.

   Special Members can serve on graduate program committees and co-direct master's thesis research. They may not direct or co-direct doctoral dissertation research or chair master's thesis examining committees.

   To qualify for appointment to any Graduate Faculty membership category, individuals normally will hold the terminal degree in their discipline. All members of the Graduate Faculty will be associated with a home unit. For Full Members of the Graduate Faculty, the

home unit is the primary unit of appointment to rank. For Associate, Graduate Teaching and Special Members of the Graduate Faculty, the home unit is the academic unit responsible for the particular graduate program initiating the request for nomination. Once appointed, members of the Graduate Faculty are available to serve across units and within multi-/cross-/interdisciplinary graduate programs.

Appointment Procedures

Tenured and tenure-track faculty are automatically appointed as Full Members of the Graduate Faculty. Tenured faculty awarded Emeritus status continue as Full Members of the Graduate Faculty for five years after retirement and may be reappointed for additional five-year terms thereafter, subject to nomination by the home unit.

A nomination is required for appointment of Associate Members, Graduate Teaching Members, and Special Members of the Graduate Faculty. Appointment is by approval of the Dean of the Graduate School.

Nominations for appointments to the Graduate Faculty are made by the Head of the home unit, on the recommendation of the Full Members of the Graduate Faculty in the unit. Each nomination will include a letter of support from the Head of the home unit, confirmation of approval of the Full Members of the Graduate Faculty in the unit, and current curriculum vitae.

The term of appointment is five years and is renewable upon re-nomination by the Head of the home unit after appropriate review within the unit. The appointment is terminated upon resignation or retirement.

The Nomination to the Graduate Faculty Form is available here.

Termination Procedures

Graduate Faculty membership is granted to ensure that graduate education is of the highest quality in terms of programs, intellectual acumen, and cutting-edge research. Members of the Graduate Faculty are expected to conduct themselves ethically and in accordance with University policy.

If a member of the Graduate Faculty is deemed to have violated University policy, the Graduate Dean can suspend or remove the faculty member from the Graduate Faculty which will result in the suspension of the rights of membership (i.e., teaching classes restricted to graduate students, designing the academic content of graduate degree programs, and supervising the writing and defense of graduate student research in the form of theses and dissertations). In such cases, the Chair of the Department (or equivalent) and/or the College Dean will ensure that the impacted graduate students are assigned a new advisor and their funding continues. The term of the suspension will be determined by the Graduate Dean in accordance with University policies.

Faculty of Multi-Campus Graduate Degree Programs

Exceptionally, faculty who hold appointments at other institutions of the University System of Maryland and who participate in approved multi-campus graduate degree programs may be appointed Full Members of the Graduate Faculty at the University of Maryland. Such exceptions will be proposed on an individual basis, be subject to approval by the Dean of the Graduate School, and be reported to the Graduate Council at its final meeting of each academic year.

Each request for an exception will include a letter of justification from the Graduate Director of the multi-campus program, confirmation of approval of the Full Members of the Graduate Faculty in the program, and current curriculum vitae. All exceptions will be effective for periods up to five years, and may be re-approved for periods of up to five years based on a review by the program and the recommendation of the Graduate Director of the program. The appointment is terminated upon resignation or retirement.

Membership of Former University of Maryland Faculty

Full Members of the Graduate Faculty who terminate their employment at the University of Maryland under honorable circumstances (and who do not have emeritus status) may for a 12-month period following their termination serve as members and chairs of thesis and dissertation examination committees. They may not serve as Dean's Representatives.

Exceptions to this Policy

Exceptions to the prerogatives listed above must be approved by the Dean of the Graduate School and will be reported to the Graduate Council at its final meeting of each academic year.

In particular, the Dean of the Graduate School may authorize Associate and Special Members of the Graduate Faculty to chair a doctoral Dissertation or master's Thesis Examining Committee on the recommendation of the home unit that the member possesses the requisite skills and scholarly expertise.

Each request for an exception will include a letter of justification from the Head of the home unit, making a compelling case that the exception is necessary to fill a particular need for a particular student, confirmation of the approval of the Full Members of the Graduate Faculty in the home unit, and a current curriculum vitae. For instance, it would be appropriate to request an exception for an Associate or Special Member to serve as the sole chair of a particular doctoral examining committee if there is no Full Member who is available or qualified to assist in the supervision.

All exceptions will be effective for periods of up to five years and may be re-approved for periods of up to five years based on a review in the home unit and the recommendation of the Head of the home unit. The appointment is terminated upon resignation or retirement.

No exceptions will be made for Graduate Teaching Members of the Graduate Faculty.

Other Graduate School Policies

Waiver of a Regulation

All policies of the Graduate School have been formulated by the Graduate Council with the goal of ensuring academic quality and approved by the Provost. These policies are to be equitably and uniformly enforced. Circumstances occasionally occur that warrant individual consideration. A graduate student who believes that there are compelling reasons for a specific regulation to be waived or modified, the student should submit a written petition to the Dean of the Graduate School , Room 2125, Lee Building, explaining the facts and issues that bear on the case. In all instances, the petition must be signed by the student's Graduate Director and, if the petition involves a course, by the course instructor. If these individuals recommend approval, in writing, the petition is then forwarded to the Office of the Dean of the Graduate School for consideration. Forms

for Petitions for Waivers of Regulation (http://gradschool.umd.edu/forms/) are available on our Graduate School website.

Application for Graduation

During the academic year, applications for graduation must be filed with the Office of the Registrar (http://registrar.umd.edu/) within the first ten days of the semester in which the candidate expects to obtain a degree. During the summer session, the application must be filed by the first week of the second summer session. Exact dates for each semester can be found on the Graduate School website (http://gradschool.umd.edu/calendar/deadlines/). Failure to meet the specific deadlines to submit the required documentation may result in a delay in graduation.

Students who applied for graduation for a certain semester but did not meet the graduation deadlines for the submission of the required graduation documentation to the Office of the Registrar (https://www.registrar.umd.edu/), the application will automatically transfer to the next semester. Students who missed the deadlines for graduation for a specific semester but complete and submit all the required graduation documentation by the end of the business day before the start of the next semester can graduate the next semester without the need to register.

Importantly, **once a student completes all degree requirements and paperwork, they are not eligible for assistantships during the next term.** This includes students who complete their degree requirements before the start of the next semester.

Academic regalia are required of all candidates at commencement exercises. Those who so desire may purchase or rent caps and gowns at the University of Maryland student supply store. Orders must typically be filed eight weeks before the date of Commencement at the University Book Center in the Stamp Student Union.

Arbitrary and Capricious Grading Policies

Policy and Procedures for Review of Alleged Arbitrary and Capricious Grading in Courses

Arbitrary and capricious grading is constituted by the assignment of a course grade to a student on some basis other than performance in the course, or the assignment of a course grade to a student by unreasonable application of standards different from standards that were applied to other students in that course, or the assignment of a course grade by a substantial and unreasonable departure from the instructor's initially articulated standards.

A student who believes he or she has received an improper final grade in a course should inform the instructor promptly. The instructor will meet with the student at a mutually convenient time and place within ten working days of receipt of the information. The purpose of the meeting is to attempt to reach a resolution.

If the instructor has left the University, is on approved leave, or cannot be reached by the student, the student should contact the Department Chairperson. The Department Chairperson, or a designee, will meet with the student as described above to attempt to resolve the problem.

If these meetings (known as the informal process) do not resolve the problem, the student may initiate a formal appeal. This appeal must be made in writing to the Dean of the Graduate School and must contain: the course title and number; the instructor's name; and a statement detailing why the grade is believed to be arbitrary and capricious as defined in this policy, and providing all relevant supporting evidence. The appeal must be received in the Dean's Office within twenty (20) days of the first day of instruction of the next semester (excluding summer and winter semesters.) If these criteria are met, the Dean will institute a formal procedure.

Formal Procedures

Each academic unit will have a standing committee of two tenured professors and two graduate level students to hear appeals of arbitrary and capricious grading. The appeal will be heard within the academic unit offering the course. If the instructor of the course is a member of the committee, that instructor will be replaced by an alternate designated by the Department Chairperson.

Each written appeal is to be reviewed by the entire committee for a decision by the majority. The committee will either dismiss the appeal, or move it forward. Grounds for dismissal are: the student has submitted the same complaint to any other grievance procedure; the allegations, if true, would not constitute arbitrary and capricious grading; the appeal was not timely; or the informal process has not been exhausted. If the appeal is dismissed, the committee will notify the student in writing within ten days of the decision, and will include the reason or reasons for the dismissal.

If the appeal is not dismissed, the committee will submit a copy of the appeal to the instructor. The instructor must reply in writing to the committee within ten days. If, based on the instructor's reply, the committee feels there is a viable solution, that solution should be pursued with the student and the instructor. If no solution is reached, the committee shall hold a fact-finding meeting with the student and the instructor. It is to be non-adversarial and informal, with neither party represented by an advocate.

Witnesses may be asked to make statements to the committee if the committee is informed prior to the meeting. The meeting will not be open to the public. The committee will meet privately at the close of the fact-finding meeting to decide whether a majority believes the evidence supports the allegation of arbitrary and capricious grading beyond a reasonable doubt. The committee will notify the student, the instructor, and the Dean of the Graduate School of the decision in writing within five days of the meeting.

The committee has the authority to take any action that it believes will bring about substantial justice, including but not limited to directing the instructor to grade the student's work anew, directing the instructor to administer a new final exam or paper, directing the cancellation of the student's registration in the course, and directing the award of a grade of "pass" in the course. The committee does not have the authority to assign a letter grade for the course or reprimand or take disciplinary action against the instructor.

The decision of the committee is final, and binding on both parties. The decision may not be appealed to any other body within the University of Maryland or the University of Maryland System.

The Dean of the Graduate School will be responsible for implementing the decision of the committee.

For more information, please review The University Policy on Arbitrary and Capricious Grading (http://www.president.umd.edu/administration/policies/section-iii-academic-affairs/iii-120a/).

Policy and Procedures for Appeals of Alleged Arbitrary and Capricious Grading of Doctoral Qualifying Examinations

The University procedures for reviewing alleged arbitrary and capricious grading of doctoral qualifying examinations envision a multi-step process. (Qualifying examinations are defined as any examinations, oral or written, that are necessary, but not sufficient, for admission to candidacy for a graduate degree.) Prior to filing a formal written appeal, the student must engage in an informal attempt to resolve the problem directly with the Chair of the Examination Committee. The Graduate School 's Ombudsperson may be called upon to facilitate resolution if both parties agree. If these informal efforts fail, then the student may file a formal appeal to the Dean of the Graduate School. When such an appeal is received by the Graduate School, the Program will be notified and will receive a copy of the appeal letter. An Appeal Committee of faculty and students established by the Department/Program will then meet to conduct the formal appeal process.

The formal appeal process consists of four phases. In the first phase, the Committee evaluates the student's written appeal and determines, according to certain established criteria, whether it should be dismissed on procedural grounds or whether the process should move forward to the next phase. In the second phase, the appeal is sent to the Chair of the Examination Committee for a written response.

In the third phase, the Appeal Committee decides if there may be a viable informal solution and if so, pursues it with both the student and the graduate program. If the Appeal Committee does not feel that such an attempt would be feasible or if the effort is unsuccessful, the process moves to phase four, which is the fact-finding phase.

In the fact-finding phase, the student, the graduate director, and a member of the examination committee meet with the Appeal Committee. Each party may make statements to the Appeal Committee and may call witnesses. This phase, however, is both informal and non-adversarial, and neither side may be represented by an advocate. After hearing both sides, the Appeal Committee meets privately to consider the evidence and decide whether the evidence offered in support of the allegation of arbitrary and capricious grading is clear and convincing. If the Appeal Committee supports the allegation, it then has several options for resolving the issue. Whatever the decision of the Appeal Committee, it is binding on both parties and is final; i.e., it may not be appealed elsewhere in the University of Maryland or elsewhere within the University System of Maryland.

Qualifying examinations are defined as any examinations, oral or written, that are necessary, but not sufficient, for admission to candidacy for a graduate degree. Arbitrary and capricious grading applies only to the grade assigned in a doctoral qualifying examination. Arbitrary and capricious grading is defined as any of the following:

a) The assignment of a grade to a student on some basis other than performance in the qualifying examination; or

b) the assignment of a qualifying examination grade to a student by an unreasonable application of standards different from standards that were applied to other doctoral students, where an objective comparison of students is possible; or

c) the assignment of an examination grade by a substantial and unreasonable departure from the graduate program's or the Examination Committee's initially articulated standards or requirements for the doctoral qualifying examination.

The Informal Appeal Process

Before proceeding to a formal appeal, the student should contact the Chair of the Examination Committee and meet, at least once, at some mutually convenient time and place in an attempt to resolve the issue or issues. This meeting should take place within 10 campus business days of the Examination Committee Chair receiving the informal appeal from the student. Campus business days do not include Saturdays, Sundays, and official campus holidays.

If the Examination Committee Chair has left the university, is on approved leave, or cannot be reached by the student, the student should contact the Department/Program Chair. The Department/Program Chair, or a faculty member designated by the Chair, will to attempt to resolve the issue.

The Ombudsperson for Graduate Students and/or the Graduate Director may be called upon to facilitate resolution if both parties agree.

The Formal Appeals Process

If the informal process does not resolve the issue, the student must file a written appeal. The written appeal must be received by the Office of the Dean of the Graduate School within 20 campus business days after the first day of instruction of the following semester.

The deadline for appeals of a spring-semester examination, or an examination taken during either semester of summer session, is the 20th campus business day after the first day of instruction of the following fall semester. Appeals of a fall semester examination or a winter term examination must be made by the 20th campus business day after the first day of instruction of the following spring semester.

The letter of appeal should contain the Examination Committee Chair(s) name, the Graduate Director(s) name, the date(s) of the examination, and an explanation of why the student believes the examination result was arbitrary and capricious, as defined by the policy. Any relevant supporting evidence should be included with the letter.

Each Program should have a standing committee to hear appeals of arbitrary and capricious grading of doctoral qualifying examinations. The Appeal Committee may be the same committee formed within the Program to hear appeals of arbitrary and capricious course grades. This committee should generally be formed specifically for the purpose of hearing appeals of arbitrary and capricious grading and not a subcommittee of any other committee. The Appeal Committee should normally be appointed at the start of the academic year. The terms of its members should be for at least one academic year.

The Appeal Committee should be composed of two tenured faculty and two graduate students appointed by the Graduate Director of the Program offering the course. In addition, the Dean of the College will appoint one additional member to the Appeal Committee who is a member of the Dean's Office staff and who is also a member of the Graduate Faculty. If no such person is available from the Dean's Office staff, the Dean will appoint a committee member from a Department/Program other than that of the appellant's Department/Program within the college.

No member of the student(s Examination Committee may also be a member of the Appeal Committee. In such a situation, a substitute member should be appointed by the Graduate Director.

All actions of the Appeal Committee are by majority vote. In the event that the Appeal Committee, at any stage of the process, is unable to reach a majority decision, the Dean of the College or his/her designee, should cast the deciding vote. In the case of inter-college programs, the participating deans may decide which of them will have responsibility for casting the deciding vote.

The Initial Evaluation Phase

In this phase, the only task of the Appeal Committee is to review the letter of appeal to determine whether the appeal should be dismissed on procedural grounds or moved forward to the next phase. If any of the specified procedural grounds for dismissal are met, the appeal must be dismissed. The procedural grounds for dismissal are as follows: a) The student did not meet with the Examination Committee Chair to resolve the issue informally; or b) the appeal was not timely (i.e., it arrived later than the 20th campus business day after the first day of instruction of the following semester, as specified above); or c) the student has already submitted the same complaint through another grievance procedure; or d) the allegations, if true, would not constitute arbitrary and capricious grading of a qualifying examination.

During this initial evaluation phase, the Appeal Committee should consider only the student's letter of appeal; it should not seek or consider comments or responses from the Examination Committee, or other faculty or students. During this initial evaluation phase, the Appeal Committee is not to decide the truth of the student's allegation(s); it should accept the student's allegations at face value (i.e., assume for the moment the allegations are true.) If, based on its evaluation of the student's letter of appeal, the Appeal Committee decides that one or more of the four procedural grounds for dismissal have been met, the Appeal Committee must dismiss the appeal and the process ends. The Appeal Committee Chair should notify the student, the Examination Committee Chair, the Graduate Director, and the Dean of the Graduate School in writing within 10 campus business days if the appeal is dismissed. The Appeal Committee Chair's letter should include the reasons for the dismissal.

The Examination Committee's Response Phase

If the appeal is not dismissed, the Appeal Committee Chair should promptly submit a copy of the student's written appeal to the Chair of the Examination Committee with a copy to the Dean of the Graduate School . The Chair of the Examination Committee should submit a written response to the Appeal Committee Chair within 10 campus business days of receiving the appeal.

The Dispute Resolution Phase

If, after reviewing the Examination Committee's response, the Appeal Committee feels that a solution may be possible, the Appeal Committee should meet with the student and the Examination Committee, separately and/or jointly, to attempt to resolve the dispute. The dispute resolution phase should not generally have a duration longer than 30 calendar days from receipt of the Examination Committee's written response, unless both Committee Chairs agree in writing to continue for a further, brief, specified period. If the Appeal Committee's resolution efforts are successful, both Committee Chairs should sign a memorandum that states the agreed-upon solution. A copy of this memorandum should be placed in the student's file in the Department/Program and a copy should be sent to the Graduate School and to the student. If resolution by the Appeal Committee either is not attempted or is unsuccessful, the Department/Program Chair, the Graduate Director, the Examination Committee Chair, and the Dean of the Graduate School should be promptly notified, and the process advances to the fact-finding phase.

The Fact-Finding Phase

If a solution is not attempted or is not reached through dispute resolution, the fact-finding meeting should be held promptly thereafter. In addition to the Appeal Committee members, the student and the Chair of the Examining Committee should be in attendance. Either party may invite witnesses to give evidence if the Appeal Committee Chair is notified prior to the meeting. The Chair of the Appeal Committee should generally be given at least 24 hours advance notice of the intention to call witnesses. During the fact-finding meeting, both the student and the Examining Committee Chair may present statements, oral or written, to the Appeal Committee as well as other documentation to support their positions. Neither party may be represented by an advocate of any kind. The meeting will not be open to the public. The Graduate School may send an administrator to observe the proceedings, but this observer should not participate substantively in the proceedings themselves. The meeting is to be both informal and non-adversarial; its purpose is to determine the relevant facts in the matter. At the close of the fact-finding meeting, the Appeal Committee will meet privately to consider the evidence presented. If the majority of the Appeal Committee believes that the student has not provided clear and convincing evidence of the allegation of arbitrary and capricious grading of a qualifying examination as defined above, the appeal must be denied. If the majority of the Appeal Committee believes that there is clear and convincing evidence that supports the allegation of arbitrary and capricious grading, the Appeal Committee will decide which of the various actions within its authority (see below) should be taken. The Appeal Committee Chair should notify the student, the Department/Program Chair, the Examining Committee Chair, the Graduate Director, and the Dean of the Graduate School in writing of the Appeal Committee's decision on the appeal within five campus business days after conclusion of the fact-finding meeting.

The Authority of the Appeal Committee

The Appeal Committee generally has the authority to take any action it believes will bring about substantial justice, except a) it may not direct that a passing grade for the qualifying examination be assigned for the student; and b) it may not reprimand or take disciplinary action against the Examination Committee or any of its members.

The following is a list of possible actions that the Appeal Committee may take. The list is not exhaustive; the Appeal Committee may take other appropriate actions in order to achieve what it believes to be substantial justice.

a) The Appeal Committee may direct the Department/Program that the examination be re-graded by a new Examination Committee from within the Program.

b) The Appeal Committee may direct the Program that the examination be re-graded by a new Examination Committee from outside the Program.

c) The Examination Committee may be directed to administer a new examination.

d) The Appeal Committee may direct that a new Examination Committee be formed from within the Department/Program which will administer and grade an entirely new examination.

e) The composition of the new Examination Committee will be determined by the Appeal Committee in accordance with the prevailing rules of the Program. At the discretion of the Appeal Committee, the new Examination Committee may have one of its members from outside of the University of Maryland .

f) In the event that the qualifying examination was an oral examination, a new oral examination must be administered.

In the event of a combined written/oral qualifying examination, a new oral portion must be administered. The Appeal Committee may direct that this new examination be administered by an Examination Committee that consists of some or all members of the original Examination Committee or an entirely new committee.

The Appeal Committee's Decision

The decision of the Appeal Committee is final and binding on both parties. The decision may not be appealed to any other body within the University of Maryland or within the University System of Maryland. If, as a result of this appeals process, the student's advisor no longer wishes to advise the student, the Graduate Director will act as the student's temporary advisor for a period of not more than six months to allow the student time to find a new advisor. If the Graduate Director is a member of the Examination Committee, this assignment will be carried out by the Department/Program Chair.

Implementation of the Appeal Committee's Decision

The Director of Graduate Studies and the Department/Program Chair will be responsible to the Dean of the Graduate School for implementing the decision of the Appeal Committee.

Graduate Student Rights and Responsibilities

It is the policy of the University of Maryland to maintain the campus as a place of study and work for students, faculty, and staff in which all parties are expected to uphold the values of the University by conducting themselves in accordance with University policies and procedures. Such an environment must be free of intimidation, fear, coercion, reprisal, harassment, bullying or other unacceptable behaviors. Graduate students can expect to be treated fairly and with dignity and respect as outlined in the University Non-discrimination Policy and Procedures [VI-1.00(B)].

GRIEVANCE PROCEDURE

The University is an academic and collegial community. Graduate students are subject to a range of policies and procedures relating to academic standards, as well as rules and regulations of behavior set forth by the University and the Office of Student Conduct. Graduate Assistants are subject primarily to the Policy on Graduate Assistantships. If a graduate student believes that they have experienced treatment that is unethical, grossly unjust, uncivil, or otherwise creates a hostile learning or working environment from a faculty member, a staff member, or another student, the student should attempt to resolve the matters locally, collegially, and informally. If the issue has not been resolved to the graduate student’s satisfaction or the treatment cannot be stopped through informal means, the graduate student may elect to file a formal grievance.

Limitations

No other University grievance procedure may be used simultaneously or consecutively with this procedure with respect to the same or substantially same issue or complaint, or with issues or complaints arising out of or pertaining to the same set of facts. Neither the University of Maryland Non-Discrimination Policy and Procedures (VI-1.00[B]) nor any other University grievance procedure may be utilized to challenge the actions, determinations, or recommendations of any person(s) or board(s) acting pursuant to these procedures.

Notwithstanding any provision of this Policy to the contrary, the following matters do not constitute the basis for a grievance under this procedure:

1. Policies, regulations, decisions, resolutions, directives and other acts of the Board of Regents of the University System of Maryland, The Office of the Chancellor of the University System of Maryland, and the Office of the President of the University of Maryland;
2. Any statute, regulation, directive, or order of any department or agency of the United States or the State of Maryland; V-1.00(A) page 4
3. Any matter outside the control of the University System of Maryland;
4. Course offerings;
5. The staffing and structure of any academic department or unit;
6. The fiscal management and allocation of resources by the University System of Maryland and the University of Maryland;
7. Any issues or acts which do not affect the complaining party directly;
8. “Class-action” grievances are not permitted under these procedures. Grievances must be presented by individual students. If multiple students file individual grievances on the same matter, a screening or hearing board may, in its discretion, consolidate grievances presenting similar facts and issues, and recommend generally applicable relief as it deems warranted;
9. Under these procedures, there may be no challenge to the award of a specific grade.

Informal Consultation

The graduate student is strongly encouraged but not required to first attempt to resolve the difficulty by discussing the situation with the person/persons (faculty member, the staff member, and/or student) as expeditiously as possible and/or practical. If a satisfactory resolution is not reached, the graduate student should next discuss the situation with the Director of Graduate Studies (or equivalent) and/or the Department Chair (or equivalent). It is expected that these discussions will be kept confidential and not discussed publicly beyond the individuals involved. However, the Director and/or Chair should keep a record of such complaints and report annually to the Graduate Ombuds Office.

Either before or after such discussions, the graduate student may wish to confidentially seek advice from another academic advisor, an assistant or associate dean of their college or of the Graduate School, or the Ombuds Officer for Graduate Students. The graduate student is encouraged to consult with the Ombuds Officer early in the informal discussion process, and must consult with the Ombuds Officer before initiating a formal grievance. The Ombuds Officer is available to all graduate students with questions or concerns related to their graduate experience, including their roles as GAs. The Ombuds Officer provides informal assistance in resolving conflicts and works to promote fair and equitable treatment within the University. The Ombuds Officer works confidentially within the scope of the law. The purpose of the Ombuds Officer is to ensure that the graduate student’s voice is heard and that problems receive prompt and impartial attention. The Ombuds Officer does not advocate for an individual; rather, the Ombuds Officer advocates for a fair process that promotes the University’s commitment to excellence in graduate education and in the graduate student experience. Queries may be directed to Ombuds Officer for Graduate Students, The Graduate School, 2103 Lee Building, phone (301) 405-3132.

Formal Grievance

These conflicts should be ideally addressed first by the Director of Graduate Studies (or equivalent) and then by the Department Chair (or equivalent) according to the process and appropriate remedies and

disciplinary actions set by the grievance policy of the college or school. If the conflict cannot be resolved at this level and/or the graduate student does not feel comfortable disclosing an issue to one or more of these parties, the grievance shall be formally filed with the dean of the college or school. The dean will initiate the grievance process created within the college or school to address such issues. The process is to remain confidential and not publicly discussed beyond the parties involved. If the Director of Graduate Studies or Chair or Dean is the subject of the accused, said person will recuse him or herself.

In cases in which this process is not effectively resolved, the graduate student may file an appeal to the Graduate School. If the grievance is with the Director of Graduate Studies or Dean, the appeal may be made directly to the Dean of the Graduate School.

Formal Appeal Process

If a satisfactory resolution has not been achieved following procedures at the unit and/or college/school level, either party may initiate an appeal process with the Graduate School by sending a written appeal to the Dean of the Graduate School. To be considered, it must be received by the Graduate Dean within 30 calendar days from the announcement of the decision at the level of the school or college. All parties will be notified of this deadline at the time of the announcement of the college/school decision. Under exceptional circumstances, the deadline may be extended at the discretion of the Graduate Dean.

1. The appeal must be signed and:
   a. Contain a clear description of the facts giving rise to the grievance;
   b. Provide a clear explanation of why the party filing the appeal found the outcome(s) of the unit and/or college/school level grievance proceedings unsatisfactory;
   c. Set forth the desired remedy; and
   d. Elect to have the Graduate Dean decide the grievance either:
      i. In the manner described in Paragraph 2.b below; or
      ii. Following receipt of a recommendation from a three-person panel appointed by the Graduate Dean to consider the matter.
2. Upon receipt of the formal appeal, the Graduate Dean (or designee) will:
   a. Share the letter of appeal with the Dean of the appropriate college or school and solicit a written response from the Department Chair and/or College Dean.
   b. Offer to meet with the parties involved, either individually or together, before reaching a decision. The Graduate Dean shall confidentially consult with the Academic Dean, Associate Provost for Faculty Affairs, and such other persons as the Graduate Dean believes may be knowledgeable about the policies, practices and issues involved. The Graduate Dean shall endeavor to convey a written decision and, where appropriate, the remedy, to the parties involved within 30 calendar days of receipt of the letter of appeal; or
   c. If the grieving party is either a graduate student or faculty member and elects to have a panel, the Graduate Dean will appoint two graduate faculty (one of whom shall serve as chair of the panel) and one graduate student, each familiar with the graduate student's discipline but not from the student's or other parties in the grievance program or department, to confidentially review the matter and make a recommendation to the Graduate Dean. If the grieving party is a staff member, the Graduate Dean will appoint one faculty (serving as chair of the panel), one staff person, and one graduate student, not from the staff's or other parties in the grievance program or department, to confidentially review the matter and make a recommendation to the Graduate Dean. The panel should conduct its review in an impartial and unbiased manner. The Graduate Dean will provide the panel with the letter of formal grievance and written responses from the Department Chair (or equivalent) and/or College Dean. The panel shall offer to meet with the parties involved, either individually or together, as well as confidentially consult other people as appropriate in determining its recommendation. The panel shall endeavor to convey its written report recommendation to the Graduate Dean within 30 calendar days of the receipt of the letter of appeal; the Graduate Dean shall endeavor to convey a written decision and, where appropriate, the remedy, to the parties involved within 15 calendar days of receipt of the panel's report. The written report of the panel will contain a statement of the issues, the panel's findings of fact, the controlling policy provisions, the panel's assessment regarding the merits of the grievance, and a recommended disposition of the grievance, including a suggested remedy and/or disciplinary action(s).

The decision of the Graduate Dean regarding the merits of the grievance and, where appropriate, the remedy/disciplinary action shall be final. The Dean of the Graduate School will convey the final decision to the parties involved as well as to the Associate Provost for Faculty Affairs for possible other actions.

General Principles Controlling Formal Grievance Procedures

These procedures are not intended to mimic a courtroom and be adversarial in nature. Rather, they are formal in the meaning of offering a structured method to investigate, weigh, and remedy differences and prevent future occurrences of such action. They are designed to preserve collegiality and minimize injury to the student-faculty, student-student, student-staff relationships. Because grievances, if not made known or not considered expeditiously, may threaten the learning experience and/or mental health of the parties involved, graduate students, faculty, and administrators share responsibility to deal with them promptly. It is also expected that proceedings are conducted confidentially in order to protect the parties involved, to minimize damage to reputations and relationships, and to prevent the occurrence of retaliatory actions. Experience has shown that the following rules promote the orderly and efficient disposition of grievances. Accordingly, they shall be observed:

1. There is a burden of proof. The graduate student has the responsibility of convincing the Graduate Dean or panel of four things: a) that the policies of the University have not been followed; b) that the graduate student has been adversely affected; c) that the actions and activities of the parties involved have long-term impacts; and d) and that the requested remedy is appropriate.
2. All matters to be considered in support or defense of a grievance should be made known as early in the informal process as possible. In both the informal and formal process, it is the responsibility of the graduate student and faculty member (or student or staff member) to produce in a timely way the evidence they each wish considered, including any documents and witnesses.
3. The Grievance Procedure is not a trial. Formal rules of evidence commonly associated with criminal and civil trials may be counterproductive in an academic investigatory process and shall not be applied. The Academic Dean, Graduate Dean, and three-member panel shall follow the rules of confidentiality and privilege, but shall otherwise accept for consideration all matters which reasonable persons would accept as having probative value in the conduct of

their affairs, giving it such weight as they consider proper. Unduly repetitive, irrelevant, or personally abusive material, however, should be excluded. They may also consider matters within the common knowledge and experience of University faculty, including published policies of the University System of Maryland and the University of Maryland.

4. The graduate student may be assisted at any meeting by an advisor, who must be a registered, degree-seeking graduate student at the University or a current member of the University Faculty or staff. Although the graduate student is expected to take an active role in all meetings, the advisor may help with the presentation of arguments and evidence.
5. The University has in place other grievance procedures and administrative processes designed to address specific types of claims. These are meant to be the exclusive avenue for review and redress. Grievances that by their subject matter may be considered under other established institutional procedures must be brought under those procedures and may not be considered under this formal procedures. Matters pertaining to the general level of wages, wage patterns, fringe benefits, or to other broad areas of financial management and staffing are not grievable under this process. Matters expressly excluded from consideration under other procedures may not be grieved under these formal procedures.
6. A decision may not be made at any step that conflicts with or modifies a policy, regulation, or grant of authority approved by the Board of Regents, the Chancellor, the President, the Provost, or the University Senate or with any applicable Federal or State of Maryland law.
7. Currently enrolled University of Maryland graduate students may initiate a formal grievance. A student that withdrew from the University or was dismissed from the University has 30 days following the date of withdrawal or dismissal to initiate a formal grievance. The Graduate Dean can grant an extension depending on the circumstances. The grievance must pertain to the graduate student personally, not those of another graduate student. Group grievances are permitted; similar grievances may be consolidated and processed together as a single issue.
8. Because it is critical to address potentially corrosive grievances sooner than later, and because the remedies and disciplinary actions available are prospective, the time requirement established for initiating a formal grievance is necessary to the effective administration of the graduate program. Unless otherwise agreed in advance among the graduate student, the faculty member (or other parties), and the Graduate Dean, strict adherence to them is a condition of review and appeal under these procedures. Time requirements are measured from the first occurrence of an event; "continuing" wrongs are not recognized for the purpose of satisfying time requirements.
9. The Graduate Dean may delegate such parts of these responsibilities as the Dean deems reasonable and efficient, provided the final decision and any remedy must be reviewed and approved by the Dean personally.
10. The University and Graduate School should make all conduct and corresponding grievance policies and processes clearly visible and accessible by graduate students, faculty and staff. The Dean of the Graduate School will provide a summary report of grievances filed and actions taken under this policy to the Graduate Council.

Advisor Policy

An advisor is responsible for providing advice regarding graduate studies and for supervising a student's degree program. In some cases, particularly for incoming students, the program may assign an advisor. Advisors must be Members of the Graduate Faculty (a listing is available here (https://academiccatalog.umd.edu/graduate/faculty/)). With approval from the program, students may have a co-advisor.

PROCEDURES FOR CHANGING ADVISORS

The advisor-student relationship is one of mutual agreement. Either party may request termination of the relationship. A change of advisors may occur for a variety of reasons, such as students and advisors having different research interests or work styles, or if faculty retire or leave the university (see the Graduate Faculty Members Policy (https://academiccatalog.umd.edu/graduate/policies/faculty-members/) for emeritus and former faculty who can chair thesis and dissertation committees).

If both parties agree to terminate the relationship and the student has secured a satisfactory arrangement with a new advisor, no further action is necessary. In extreme circumstances, when a change of advisors cannot be resolved amicably, the following procedures support students and faculty in the change of advisors process.

1. A change of advisors begins with an open and honest conversation among the student, current advisor, potential new advisor, director of graduate studies, and/or the department chair. Each situation is unique, but the important part is to have confidential conversations with the appropriate stakeholders. Before such conversations, it may be helpful to prepare a document briefly identifying reasons for the change of advisor.

   The director of graduate studies and unit head can provide support for graduate students and faculty. If a department, school, or college has an ombudsperson, that person can also be included in confidential conversations, at the discretion of graduate students or advisors. For students and faculty, The Graduate School Ombudsperson (https://gradschool.umd.edu/about-us/ombuds-office/) provides confidential and informal assistance in resolving conflict and promotes fair and equitable treatment within the university. For extreme situations, (https://academiccatalog.umd.edu/graduate/policies/school-policies/) the Graduate Student Rights and Responsibilities Policy (https://academiccatalog.umd.edu/graduate/policies/school-policies/) outlines the formal grievance procedure. Departments may have their own grievance policies, which should also be consulted. When mental health challenges contribute to difficulties with advisors, the Graduate Academic Counselor is available to consult with students and faculty and can provide referrals to campus and other resources.
2. If agreement is not achieved or the student is unable to secure a satisfactory arrangement with a new advisor, the student, advisor, director of graduate studies, and/or department chair should discuss potential faculty members to serve as the new advisor. Once a new advisor is secured, a transition plan should be created for completing work with the former advisor and starting work with the new advisor. The transition plan must include any implications of the advisor change for coursework, exams, advancement to candidacy, and other program requirements. For students with funding, the transition plan must also address how students' funding will be maintained. Finally, the transition plan must address intellectual property concerns (e.g.,

ownership of data, authorship on completed or ongoing research, etc.). The student, former advisor, new advisor, and director of graduate studies must sign the transition plan. In some cases it may not be possible to find a new advisor, despite the best efforts of the graduate director and/or graduate program, particularly if the original conflict arose because of lack of student progress or changes in the student's desired research field. If a new advisor cannot be secured, students have the option of consulting The Graduate School Ombudsperson (https://gradschool.umd.edu/about-us/ombuds-office/) and filing a grievance as outlined in the Graduate Student Rights and Responsibilities Policy (https://academiccatalog.umd.edu/graduate/policies/school-policies/).

FUNDING CONSIDERATIONS

For graduate students with research, teaching, or administrative assistantships, funding typically will be maintained to support graduate students who change advisors. For programs where graduate assistantship funding is made independent of advising, no change of funding will occur when students change advisors.

Research Assistants

Funding will be maintained for research assistants at least through the semester while they change advisors, including when graduate students are supported by their advisors' external funding awards. Advisors will give at least one month's notice prior to terminating a student's support. The former advisor, new advisor, or graduate program will typically continue to support the student through the end of the semester if the support is during the academic year as long as the student is making satisfactory contributions to assigned research duties. If the support is over the summer, the advisor or graduate program will typically continue to support the student over the summer as long as the student is making satisfactory contributions to assigned research duties. If extraordinary circumstances compel the advisor to consider terminating the student with less than one month's notice, the director of graduate studies must approve the early termination.

Teaching Assistants

Funding will be maintained at least through the semester for teaching assistants while they change advisors. The instructor of record or course supervisor will give at least one month's notice prior to terminating a student's support. Typically, a graduate student will complete their instructional duties through the end of a term as long as the student is satisfactorily completing teaching duties. If extraordinary circumstances compel the instructor of record or course supervisor to consider terminating the student before the term ends, the director of graduate studies must approve the early termination.

Administrative Assistants

Funding will be maintained at least through the semester for administrative assistants while they change advisors. Typically, the assistantship sponsor will continue to support the student through the end of the semester if the support is during the academic year as long as the student satisfactorily completes the assigned administrative duties. If the support is over the summer, the assistantship sponsor will continue to support the student over the summer as long as the student satisfactorily completes the assigned administrative duties. If extraordinary circumstances compel the supervisor to consider terminating the student with less than one month notice, the director of graduate studies must approve the early termination.

Co-authorship for Faculty-Student Interactions or Collaborations

The University of Maryland encourages faculty to co-author with students. Co-authorship is valuable for a student's professional development and advancement. It also can advance a faculty member's career. However, it is critical that authorship decisions, particularly those related to faculty-student interactions or collaborations, be handled in an appropriate and respectful manner that protects the interests of our students and faculty, demonstrates the value of authorship credit, and ensures the integrity of the institution's approach to publication.

General Principles

Although specific disciplines may approach aspects of authorship or collaboration in different ways, there are general principles that are universally applicable when it comes to the assignment of authorship credit and order.

1. All individuals listed as authors on a manuscript should meet the criteria below for authorship, and all individuals who meet these criteria should have the option to be listed on the manuscript.
2. The generally accepted criteria for authorship are as follows. These are generally accepted criteria, but norms may differ by discipline. All three criteria should be met. Authors should also agree to be accountable for all aspects of the work by ensuring that questions regarding the accuracy or integrity of any part of the work are appropriately investigated and resolved.:
   a. making substantial contributions to the conception and design of the research, the acquisition of the data, or the analysis and interpretation of the data;
   b. drafting the manuscript or revising it critically for important intellectual content; and
   c. giving final approval of the version to be published.
3. Authorship credit should not be given solely based on the provision of funding, materials used in the research, or space in which to conduct the research; collection of data; or general supervision of an author or the research group.
4. Authorship credit, including the order of authors, should be discussed early and revisited often, especially if the scope of the work changes over time. Ordinarily, authorship order should follow the convention of the relevant discipline(s). Authorship discussions must include individuals who have left the institution or research group but who previously contributed to the work to be presented in the manuscript.
5. Individuals who make valuable contributions, but do not meet the requirements for co-authorship, may be acknowledged in a publication with the permission of the individual(s) to be acknowledged.
6. Individuals must have the opportunity to satisfy the criteria set forth above (e.g., relevant individuals should be notified that a manuscript is under preparation so that they have an equal opportunity to make substantial contributions to the drafting or revision process).

Issues Common to Faculty-Student Interactions or Collaborations

The standards for co-authorship are the same for faculty and students. However, there are some circumstances that arise in faculty-student interactions or collaborations that should be highlighted and addressed.

1. Faculty should not use their position of authority to request or demand co-authorship when it is inappropriate, according to the

standards outlined above. Students should not grant "honorary authorship" by including a faculty member who has not met the criteria for authorship.
2. Faculty should offer students co-authorship when they have met the standards outlined above.
3. Whether a student should be a co-author depends only on their contribution to the work; faculty may not refuse or place other conditions on student co-authorship.
4. Except under exceptional circumstances, a student should be listed as principal author on any multiple-authored publications that are substantially based on the student's independent research conducted under faculty supervision (including thesis or dissertation).

Accordingly, faculty may co-author only when they have:

1. Made substantial contributions to the work (e.g., conception, design, conduct, analysis, or interpretation) and have engaged in substantial drafting and/or revisions of the intellectual content of the work; and
2. Reviewed and approved the final version and agreed to be accountable for the accuracy and integrity of the published work.

Faculty should not co-author when they have only:

1. Provided funding, space, materials, or technical services, without making substantial contributions to the work; and/or
2. Provided comments or suggestions of the sort that might be provided by peer review, including when serving on a thesis or dissertation committee.

Addressing authorship disputes and inappropriate authorship practices

If disagreements arise about co-authorship among faculty and graduate students, the Graduate Ombudsperson (https://www.gradschool.umd.edu/about-us/ombuds-office/) can be consulted. Students may also consider the advice provided by the Committee on Publication Ethics (COPE) in its guide for new researchers (https://publicationethics.org/resources/guidelines-new/how-handle-authorship-disputesa-guide-new-researchers/) or its discussion document on authorship (https://publicationethics.org/files/COPE_DD_A4_Authorship_SEPT19_SCREEN_AW.pdf).

Failure of a faculty member to abide by the expectations set forth in this document may result in referral of the matter to a faculty member's department chair for review and action as appropriate. Failure of a graduate student to abide by these expectations may result in a similar referral to the student's director of graduate studies or the Office of Student Conduct, as appropriate.

Extreme cases of inappropriate authorship practices are forms of scholarly misconduct that would trigger the process set forth in the University's Policy and Procedures Concerning Scholarly Misconduct (https://policies.umd.edu/policy/5b654bd4-db87-491f-8616-564830b2fa2f/). These cases include improper assignment of credit, plagiarism, and misappropriation of ideas.

In cases where faculty members fail to abide by these expectations, the Graduate Dean can suspend or remove a faculty member from the Graduate Faculty following the University Policy on Graduate Faculty Members (https://academiccatalog.umd.edu/graduate/policies/faculty-members/). As stated in the University's Policy and Procedures Concerning Scholarly Misconduct (https://policies.umd.edu/policy/5b654bd4-db87-491f-8616-564830b2fa2f/), disciplinary action for faculty may also include suspension and/or termination of employment. Disciplinary action for students may include termination of enrollment and/or degree revocation.

Appointments of Graduate Students as Instructional or Research Faculty

Graduate students are a vital component of the University of Maryland's (UMD) undergraduate teaching and research mission. At the same time, graduate students are students first. Accordingly, all full-time UMD graduate students serving as instructors of record for a credit-bearing course will be appointed as graduate assistants (e.g., teaching assistants) rather than in Professional Track Faculty Appointments (e.g., adjunct faculty, lecturer, visiting faculty). Likewise, all full-time graduate students working with faculty on research will be appointed as research assistants rather than as research faculty (e.g., faculty assistant, faculty specialist).

Graduate students who were UMD faculty or staff prior to entering a UMD graduate program are exempt from this policy. Programs can petition the Graduate School to exempt other graduate students and/or a degree program from this policy under all of the following conditions:

- The graduate student will complete their degree requirements within one year.
- Teaching appointments will not be renewable until the graduate student has completed all degree requirements.
- The salary provided to the graduate student will be higher than the stipend provided to the graduate student in the prior calendar year. The salary also should be comparable to other adjunct, instructional, or visiting faculty in the program.
- The graduate student will remain enrolled in relevant coursework (e.g., 899).

To petition the Dean of the Graduate School for an exemption, a student must submit a Petition for Waiver of Regulation Form (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Forms/petition_for_waiver_of_regulation.pdf) and include the following information:

- A letter of support from their advisor and director of graduate studies.
- A detailed and accurate timeline for degree completion.
- Statement from their advisor and director of graduate studies affirming the above conditions will be met.

Upon successful completion of degree requirements, UMD graduate students are eligible for hiring as instructional and research faculty. Remaining primary status as graduate students ensures that the Graduate School can support UMD graduate students to timely degree completion.

Graduate School Services

The Office of Graduate Diversity and Inclusion (OGDI)

The Office of Graduate Diversity and Inclusion is dedicated to fostering a supportive University environment for graduate students from under-represented and under-served groups. OGDI provides campus leadership for identifying, recruiting, retaining, and graduating a diverse graduate student body. The Office's programs and services aim to attract new students, to build a collaborative and cooperative community, and

to promote professional development among graduate students to ensure academic success. It's initiatives include, but are not limited to: **conducting student recruitment activities**, including campus visits, supporting summer undergraduate research programs; **building a supportive community** through collaboration with graduate student organizations; **sponsoring programs and activities designed to foster professional development**, including workshops and seminars on academic and research skills, retention initiatives, and preparing graduate students for the professoriate and other careers. The Office also assists the University's various colleges and departments in creating an environment supportive of the academic success of historically under-represented and under-served graduate students. The Office can be reached at 2100B Lee Building, 301-405-0763, and by visiting the OGDI website (https://gradschool.umd.edu/ogdi/).

Graduate School Writing Center

The Graduate School Writing Center offers support for graduate students at every stage of their development as academic and professional writers who can, in turn, fulfill the university's mission of sharing research, educational, cultural, and technological strengths with the broader community. You can read more about the center's learning outcomes here (https://gradschool.umd.edu/graduate-school-writing-center/learning-outcomes/).

We offer the following services:

- Writing and oral communication consultations (see our consultation policies (https://gradschool.umd.edu/graduate-school-writing-center/consultation-policies/), find the right consultant for you (https://gradschool.umd.edu/graduate-school-writing-center/meet-fellows/), pick a type of consultation (https://gradschool.umd.edu/graduate-school-writing-center/request-consultation/), and schedule through our online system (https://umdgrad.mywconline.com/))
- Writing workshop (https://gradschool.umd.edu/graduate-school-writing-center/workshops/) and weekly write-in (https://gradschool.umd.edu/graduate-school-writing-center/weekly-write-ins/)s
- Writing Groups (https://gradschool.umd.edu/graduate-school-writing-center/writing-groups/)
- English editing for international graduate students (https://gradschool.umd.edu/graduate-school-writing-center/english-editing-international-graduate-students/)

And the following resources:

- Information on how to use sources in your writing (https://gradschool.umd.edu/graduate-school-writing-center/using-sources/)
- Resources for writing in your, or another, discipline (https://gradschool.umd.edu/graduate-school-writing-center/resources-writing-disciplines/)
- Resources for writing in a specific linguistic or cultural context (https://gradschool.umd.edu/graduate-school-writing-center/cultural-and-linguistic-awareness/)

Professional and Career Development

The Graduate School's Professional and Career Development (https://gradschool.umd.edu/professionaldevelopment/) services provide graduate students with opportunities to explore and prepare for a wide range of careers. Professional and career development services for graduate students are delivered through a unique partnership between The Graduate School and The University Career Center & The President's Promise (http://careers.umd.edu/).

Engaging in purposeful professional development and career planning are important parts the graduate experience and essential to maintaining a personally satisfying career across one's life-time. From day one, all graduate students should actively engage with their adviser, participate in departmental events, attend career workshops and pursue professional development opportunities in and outside of the university.

Accessing Services

Career services for Master's students are provided by:

- The University Career Center and the Presidents Promise (http://careers.umd.edu/)
- The Office of Career Services (http://www.rhsmith.umd.edu/office-career-services/) at the Robert H. Smith School of Business
- Engineering Career Services (http://www.coop.eng.umd.edu/home/)in the A. James Clarke School of Engineering
- Career Services in the School of Public Policy (https://spp.umd.edu/career-connections/)

Master's students should contact these office directly and visit the websites for more information about specific services.

Professional development and career services for PhD students and Postdoctoral Associates are coordinated by Dr. Susan Martin. For more information about resources and events, email smarti18@umd.edu, call (301) 405-8236, or sign up for an appointment in Careers for Terps (C4T) (https://careers.umd.edu/careers4terps/).

- Unfamiliar with C4T? Download instruction sheets with steps and screenshots for setting up your C4T account (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Careers/setting_up_your_careers4terps_account.pdf) and scheduling an appointment (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Careers/scheduling_an_appointment_in_c4t.pdf) in C4T.
- To learn more about upcoming career events visit the Graduate School Events Calendar (https://gradschool.umd.edu/calendar/events/) and The University Career Center & The President's Promise Events Calendar (http://careers.umd.edu/events-calendar/).
- Review and download the printable flier 2019-2020 PhD Career Development Workshops (https://gradschool.umd.edu/sites/gradschool.umd.edu/files/uploads/Careers/final_phd-sws_poster-2019-20.pdf) for current doctoral students and postdocs.

The Office of Postdoctoral Affairs

The Office of Postdoctoral Affairs was established to provide the postdoctoral community with information, training, mentoring, and services in support of career development.

POSTDOCTORAL SCHOLARS

Postdoctoral associates are a critical part of the University of Maryland academic community, bringing valuable expertise, national prestige, and additional research funding into the university. UMD welcomes postdoctoral associates in all disciplines to the university and hopes that the relationships formed and research done during their tenure here will be most helpful in their professional development.

POSTDOCTORAL DEVELOPMENT

The Office of Postdoctoral Affairs offers many workshops, of varying length, to support postdocs with their professional development and career planning needs. All workshops are open to postdocs free of charge. Please see the Events section (https://gradschool.umd.edu/calendar/events/?field_gs_event_type_tid=All&field_gs_event_date_value%5Bvalue%5D%5Byear%5D=&keys=postdoc) for the current workshop schedule.

We welcome suggestions for workshops from postdocs and departments. Please contact Dr. Blessing Enekwe (blessing@umd.edu), Program Director for the Office of Postdoctoral Affairs, with questions.

Ombuds Office for Graduate Students

The Ombuds Office for Graduate Students (https://gradschool.umd.edu/about-us/ombuds-office/) seeks to ensure that the graduate student voice is heard and that problems receive impartial attention. The Ombuds Office is available to all graduate students with questions or concerns related to their graduate experience. The Ombuds Office provides confidential, informal, and independent assistance to resolve conflicts, and promotes fair and equitable treatment within the University. The office can be reached at 301-405-3132, or by contacting Dr. Mark A. Shayman (shayman@umd.edu).

Graduate Legal Aid Office

The Graduate Legal Aid Office provides free legal advice, referrals, and assistance to currently registered University of Maryland graduate students. Staff members give general legal advice on a wide variety of matters, including landlord-tenant issues, consumer problems, traffic accidents, uncontested divorces, and University-related matters. The Office provides direct legal assistance in routine matters, but cannot sue on behalf of students or represent them in court. The Office is staffed eight hours a week for student interviews; staff members see students on a walk-in basis and by appointment. Walk-in and appointment schedules are posted on the Office door. The Office cannot handle disputes between graduate students (though the Ombudsperson for Graduate Students may be consulted for assistance in these disputes) and does not provide emergency services. For more information, consult the Graduate Student Legal Aid Office website (https://terplinksites.umd.edu/Departments/GradLegalAid/).

English Editing for International Graduate Students

The English Editing for International Graduate Students (EEIGS) program is a unique opportunity for enrolled University of Maryland international students. Through this program, international students may submit portions of required academic writing for free editing. Editors are volunteers from the university's Volunteer Service Corps.

This is an online service: students submit papers electronically as Word documents and editors respond using the "track changes" feature in Word. All documents submitted for review must be submitted in Word; we cannot review documents submitted in LaTeX, PDF, or PowerPoint.

EEIGS services are available only during the regular academic year (fall and spring semesters). Because services are provided by volunteers, the number of requests that can be fulfilled and the time it takes to respond to papers may fluctuate. Please be aware of this, and make sure to plan accordingly.

To use the services of EEIGS, students must follow these requirements:

- Students must be currently enrolled, international graduate students at the University of Maryland, College Park.
- Students are limited to one request per week.
- Each paper must be submitted with a student request form (https://umd.box.com/s/iwmvnl63reb1ke1h8gpvvb53j7ij6sm6/)
- Students may submit no more than 50 double-spaced pages per semester. Any papers over 10 pages long may be worked on in sections over several weeks, as services are available).
- EEIGS does not have the capacity to review entire dissertations for editing.
- Papers must be submitted as Word documents. No other formats will be accepted. If your document is generated in LaTex or PDF or as a PowerPoint presentation, you must convert the text to Word in order for it to be reviewed. Please also be sure that you have removed any previous comments from the paper before submitting it for review.
- Students who use the services of EEIGS must inform their advisor or their program's director of graduate studies about the aid received in this program. This is a matter of academic integrity.
- Students are responsible for any assigned deadlines for their own work. EEIGS and the volunteer editors are not responsible for any deadlines related to the assignment. Students should plan editing turnaround time into their writing schedules.
- Students should note that EEIGS has limited expertise with CVs or resumes; consult the University Career Center (http://careers.umd.edu/) with requests to review these documents.

Students using the services of EEIGS can expect that:

- EEIGS volunteers will edit and proofread students' projects through the "comments" and "track changes" in Microsoft Word.
- EEIGS volunteers will be generalists who will not provide specific feedback about the content and development of ideas in a paper (for that service, please request a consultation (https://gradschool.umd.edu/graduate-school-writing-center/request-consultation/) with the Graduate School Writing Fellows)
- The EEIGS coordinator will seek a volunteer editor for each request and will report the results to the student. Students may request a specific editor; however, all requests will initially go through the EEIGS coordinator.
- Submitted requests up to 10 double-spaced pages will be returned within 5 days.

How to request editing services from EEIGS:

- Requests (**only one per week**) must be submitted to the program coordinator through email (eeigs@umd.edu).
- Each paper should be accompanied with a student request form (https://umd.box.com/s/iwmvnl63reb1ke1h8gpvvb53j7ij6sm6/) that includes student contact information and information about the assignment.

Questions? Please contact the EEIGS coordinator at eeigs@umd.edu.

Appendices

Topics for which additional references can be found:

1. Policy for Student Residency Classification for Admission, Tuition and Charge-Differential Purposes

Admissions Policies (p. 999)
Residency Classification Office (http://registrar.umd.edu/resreclass.html)

2. Academic Integrity
Academic Record (p. 1022)
III-1.00 Policy on Faculty, Student and Institutional Rights and Responsibilities for Academic Integrity (http://www.usmh.usmd.edu/regents/bylaws/SectionIII/III100.html)
III-1.00(A) UMCP Code of Academic Integrity (https://president.umd.edu/administration/policies/section-iii-academic-affairs/iii-100a/)
3. Code of Student Conduct and Annotations
Graduate Catalog (p. 15)
V-1.00(B) UMCP Code of Student Conduct (https://www.president.umd.edu/administration/policies/section-v-student-affairs/v-100b/)
4. Human Relations Code
Graduate Catalog (p. 15)
Office of Legal Affairs (https://www.president.umd.edu/office-general-counsel/)
VI-1.00(B) University of Maryland Human Relations Code (https://www.president.umd.edu/administration/policies/section-vi-general-administration/vi-100b/)
5. Campus Policy and Procedures on Sexual Harassment
Graduate Catalog (p. 15)
VI-1.20 University of Maryland System Policy on Sexual Harassment (http://www.usmh.usmd.edu/regents/bylaws/SectionVI/VI120.html)
VI-1.20(A) University of Maryland Sexual Misconduct Policy and Procedures (https://www.president.umd.edu/administration/policies/section-vi-general-administration/vi-160a-0/)
VI-1.30 University of Maryland System Policy on Sexual Assault (https://www.president.umd.edu/administration/policies/section-vi-general-administration/vi-160a-0/)
VI-1.30(A) UMCP Procedures on Sexual Assault (https://www.president.umd.edu/administration/policies/section-vi-general-administration/vi-160a-0/)
6. UMCP Graduate Policy and Procedures for Review of Alleged Arbitrary and Capricious Grading
Graduate Catalog (p. 15)
III-1.20 Policy for Review if Alleged Arbitrary and Capricious Grading (http://www.usmd.edu/regents/bylaws/SectionIII/III120.html)
III-1.20(A) UMCP Procedures for Review of Alleged Arbitrary and Capricious Grading–Graduate Students (https://www.president.umd.edu/administration/policies/section-iii-academic-affairs/iii-120a/)
Procedures Guide for Conducting Appeals of Alleged Arbitrary and (p. 1040)Capricious Grading of Doctoral Qualifying Examinations
7. University of Maryland at College Park Policy on Copyrights and Patents
Graduate Catalog - Master's Students (p. 1026)
Graduate Catalog - Doctoral Students (p. 1031)
IV-2.20 Policy on Classified and Proprietary Work (http://www.usmd.edu/regents/bylaws/SectionIV/IV220.html)
IV-3.00 Policy on Patents (http://www.usmh.usmd.edu/regents/bylaws/SectionIV/IV300.html)
IV-3.00(A) UMCP Procedures on Patent and Technology Transfer (http://www.usmh.usmd.edu/regents/bylaws/SectionIV/IV300.html)
IV-3.10 Policy in Copyrights (http://www.usmh.usmd.edu/regents/bylaws/SectionIV/IV310.html)
8. Class Exercises That Involve Animals
UM Policy (https://research.umd.edu/IACUC/)
9. Animal Care and Use Program
UM Policy (https://research.umd.edu/IACUC/)
10. Research Involving Human Subjects
Graduate Catalog - Master's Students (p. 1026)
Graduate Catalog - Doctoral Students (p. 1031)
IV-2.10 University if Maryland System Policy in Human Subjects of Research (https://www.president.umd.edu/sites/president.umd.edu/files/documents/policies/IV-210.pdf)
11. Guidelines for Combined Bachelor's/Master's Programs
Graduate Catalog (p. 15)
III-2.20(A) UMCP Policy and Guidelines for Combined Bachelor's/Masters Programs (https://president.umd.edu/administration/policies/section-iii-academic-affairs/iii-220a/)
Policy on Combined Bachelor's/Master's Programs (http://www.usmh.usmd.edu/regents/bylaws/SectionIII/III220.html)
12. Inter-Institutional Registration
Graduate Catalog (p. 15)
III-2.41 Policy on Graduate Student Inter-Institutional Registration (http://www.usmh.usmd.edu/regents/bylaws/SectionIII/III241.html)
13. University Policy on Disclosure of Student Records
III-6.30 Policy on Confidentiality and Disclosure of Student Records (https://www.sis.umd.edu/ferpa/ferpa_policy.htm)
III-6.30(A) UMCP Policy and Procedures on the Disclosure of Student Education Records (https://www.president.umd.edu/administration/policies/section-iii-academic-affairs/iii-630a/)
14. Immunization Policy
Graduate Catalog (p. 15)
V-1.00(H) UMCP Immunization Policy (https://www.president.umd.edu/administration/policies/section-v-student-affairs/v-100h/)
15. Policy on Student Alcohol and Other Drug Abuse
UMCP Policy on Student Alcohol and Other Drugs Abuse (http://www.health.umd.edu/sites/default/files/AOD%20Policy%20And%20Resource%20Guide%202014-2015.pdf)
16. Smoking Policy and Guidelines
UMCP Smoking Policy and Guideline (https://umdrightnow.umd.edu/news/university-maryland-goes-smoke-free/)

Resources

Research Centers & Institutes

- Research Centers, Institutes, Laboratories, Galleries, and Bureaus (https://www.umd.edu/centers-and-institutes/)
- Centers and Institutes by College or Division (https://www.provost.umd.edu/Centers/indexcollege.html)
- Office of Sustainability: Research Centers (https://sustainability.umd.edu/education-research/research-centers/)

Campus Services

- Graduate Student Support Services (https://gradschool.umd.edu/students/#student-support-services)
- University Health Center (http://www.health.umd.edu/)
- University Counseling Center (https://www.counseling.umd.edu/)
- University Human Resources (https://uhr.umd.edu/)
- Office of Student Conduct (https://studentconduct.umd.edu/)
- Office of Student Financial Services and Cashiering (https://billpay.umd.edu/)

- Office of Financial Aid (https://www.financialaid.umd.edu/)
- Office of the Registrar (http://registrar.umd.edu/)
- Department of Transportation (http://dots.umd.edu/)
- Graduate Student Legal Aid Office (https://terplinksites.umd.edu/Departments/GradLegalAid/)
- International Student and Scholar Services (http://globalmaryland.umd.edu/offices/international-students-scholar-services/)
- Disability Support Service (https://www.counseling.umd.edu/ads/)
- Dining and Housing Services (https://www.studentaffairs.umd.edu/dining-housing/)
- Family Care Resources (https://uhr.umd.edu/benefits/family_care/)

Campus Engagement

- Leadership and Community Service-Learning (http://thestamp.umd.edu/leadership_community_service-learning/)
- Multicultural Involvement and Community Advocacy (http://thestamp.umd.edu/multicultural_involvement_community_advocacy/)
- University Recreation and Wellness (https://recwell.umd.edu/)
- Graduate Student Life (http://thestamp.umd.edu/graduate_student_life/)
- Veteran Student Life (http://thestamp.umd.edu/veteran_student_life/)
- Graduate Student Government (https://www.gsgumd.org/)
- Student Organizations (http://orgsync.umd.edu/browse_student_organizations/)

ABOUT THE UNIVERSITY

- Academic Calendars (p. 1054)
- Accreditation (p. 1056)
- University Administration and Deans (p. 1057)

ACADEMIC CALENDARS

All undergraduate programs, and most graduate programs, follow the semester calendar. Some graduate programs follow the 12-week term calendar. Consult the individual department or program for the appropriate calendar to use. For current year academic deadlines and other scheduling information, see Academic Deadlines (http://www.registrar.umd.edu/deadlines.html).

- Semester Calendar (p. 1054)
- 12-Week Calendar (p. 1054)

Semester Calendar 2021-2022

Fall Semester - 2021

Event	Date
First Day of Classes	August 30 (Monday)
Labor Day	September 6 (Monday)
Thanksgiving Recess	November 24-November 28 (Wednesday-Sunday)
Last Day of Classes	December 13 (Monday)
Reading Day	December 14 (Tuesday)
Final Exams	December 15-21 (Wednesday-Tuesday)
Commencement - Main Ceremony[1]	December 20 (Monday)
Commencement - College/ Department Ceremonies[1]	December 21-22 (Tuesday-Wednesday)

[1] See http://commencement.umd.edu for any updates.

Winter Term - 2021-22

Event	Date
Classes Begin	January 3 (Monday)
Dr. Martin Luther King Holiday	January 17 (Monday)
Classes End	January 21 (Friday)

Spring Semester - 2022

Event	Date
First Day of Classes	January 24 (Monday)
Spring Break	March 20-27 (Sunday-Sunday)
Last Day of Classes	May 10 (Tuesday)
Reading Day	May 11 (Wednesday)
Final Exams	May 12-18 (Thursday-Wednesday)
Commencement - College/ Department Ceremonies[1]	May 18-19 (Wednesday-Thursday)
Commencement - Main Ceremony and College/ Department Ceremonies[1]	May 20 (Friday)

[1] See http://commencement.umd.edu for any updates.

Summer Term - 2022

Event	Date
Sessions I and I-A Begin	May 31 (Tuesday)
Session I-A Ends	June 17 (Friday)
Juneteenth Holiday	June 20 (Monday)
Session I-B Begins	June 21 (Tuesday)
Independence Day Holiday	July 4 (Monday)
Sessions I and I-B End	July 8 (Friday)
Sessions II and II-C Begin	July 11 (Monday)
Session II-C Ends	July 29 (Friday)
Session II-D Begins	August 1 (Monday)
Sessions II and II-D End	August 19 (Friday)

All dates are subject to change. Updates and future academic calendars can be viewed at https://www.provost.umd.edu/calendar/.

12-Week Term Calendar 2021-2022

Fall Term - 2021

Event	Date
First Day of Classes	August 30 (Monday)
Labor Day	September 6 (Monday)
Last Day of Classes	November 19 (Friday)

Winter Term - 2021-22

Event	Date
Classes Begin	November 29 (Monday)
Winter Break	December 24 (Friday) through January 2 (Sunday)
Dr. Martin Luther King Holiday	January 17 (Monday)
Last Day of Classes	February 18 (Friday)

Spring Term - 2022

Event	Date
First Day of Classes	February 28 (Monday)
Spring Break	March 20-27 (Sunday-Sunday)

Last Day of Classes	May 18 (Wednesday)

Summer Term - 2022

Event	Date
First Day of Classes	May 31 (Tuesday)
Juneteenth Holiday	June 20 (Monday)
Independence Day Holiday	July 4 (Monday)
Last Day of Classes	August 19 (Friday)

All dates are subject to change. Updates and future academic calendars can be viewed at https://www.provost.umd.edu/calendar/.

ACCREDITATION

The University of Maryland, College Park is accredited by the Middle States Commission on Higher Education (MSCHE), http://www.msche.org (http://www.msche.org/), under the authority of the U.S. Department of Education. In addition, individual colleges, schools, and departments are accredited by a number of other groups:

Accreditors Approved by the U.S. Secretary of Education

- Academy of Nutrition and Dietetics, Accreditation Council for Education in Nutrition and Dietetics
- American Psychological Association, Committee on Accreditation
- American Speech-Language-Hearing Association, Council on Academic Accreditation in Audiology and Speech-Language Pathology
- American Veterinary Medical Association, Council on Education
- Commission on English Language Program Accreditation
- Council on Education for Public Health
- National Association of Schools of Dance, Commission on Accreditation
- National Association of Schools of Music, Commission on Accreditation

Other Accreditors

- American Association for Marriage and Family Therapy, Commission on Accreditation for Marriage and Family Therapy Education
- American Library Association (ALA)
- Association to Advance Collegiate Schools of Business (AACSB)
- Council for the Accreditation of Educator Preparation (CAEP)
- Accreditation Board of Engineering and Technology (ABET)
- Accrediting Council on Education on Journalism and Mass Communications (ACEJMC)
- Institute of Food Technologists
- Landscape Architecture Accreditation Board (LAAB)
- Maryland State Department of Education (MSDE)
- National Architectural Accrediting Board (NAAB)
- National Association of Schools of Public Affairs and Administration
- Planning Accreditation Board

Evaluated Rather Than Accredited

- Maryland Sea Grant College (National Sea Grant Review Panel)
- Water Resources Center (United States Department of the Interior, U.S. Geological Survey)

For more information about Accreditation see https://provost.umd.edu/accreditation (https://provost.umd.edu/accreditation/).

UNIVERSITY ADMINISTRATION AND DEANS

Administration

President **Darryll J. Pines, Ph.D.**

Senior Vice President and Provost **Jennifer King Rice, Ph.D.**

Vice President and Chief Administrative Officer **Carlo Colella**

Vice President for Diversity and Inclusion **Georgina Dodge, Ph.D.**

Vice President for Information Technology and Chief Information Officer **Jeffrey Hollingsworth, Ph.D.**

Vice President for Research **Laurie Locascio, Ph.D.**

Vice President for Student Affairs **Patty Perillo, Ph.D.**

Vice President for Legal Affairs and General Counsel **Michael Poterala, J.D.**

Vice President for University Relations **Brodie Remington**

Vice President for Marketing and Communications **Brian Ullmann**

Deans

Dean of the College of Agriculture and Natural Resources **Craig Beyrouty, Ph.D.**

Dean of the School of Architecture, Planning, and Preservation **Dawn Jourdan, Esq., Ph.D.**

Dean of the College of Arts and Humanities **Bonnie Thornton Dill, Ph.D.**

Dean of the College of Behavioral and Social Sciences **Gregory Ball, Ph.D.**

Dean of the Robert H. Smith School of Business **Prabhudev Konana, Ph.D.**

Dean of the College of Computer, Mathematical, and Natural Sciences **Amitabh Varshney, Ph.D.**

Interim Dean of the College of Education **Laura Stapleton, Ph.D.**

Interim Dean of the A. James Clark School of Engineering **Robert Briber, Ph.D. (through September 30, 2021)**
Dean of the A. James Clark School of Engineering **Samuel Graham, Jr., Ph.D. (effective October 1, 2021)**

Associate Provost and Dean of The Graduate School **Steve Fetter, Ph.D.**

Dean of the College of Information Studies **Keith Marzullo, Ph.D.**

Dean of the Philip Merrill College of Journalism **Lucy Dalglish, J.D.**

Dean of the School of Public Health **Boris Lushniak, M.D.**

Dean of the School of Public Policy **Robert Orr, Ph.D.**

Associate Provost and Dean for Undergraduate Studies **William A. Cohen, Ph.D.**

Dean of University Libraries **Adriene Lim, Ph.D.**

Interim Associate Dean and Chair, Department of Veterinary Medicine, Maryland Campus **Xiaoping Zhu, Ph.D.**

Division of Academic Affairs

1119 Thomas V. Miller Jr. Administration Building
301-405-5252
provost@umd.edu
www.provost.umd.edu (http://www.provost.umd.edu)

Jennifer King Rice, Ph.D., Senior Vice President and Provost

The Senior Vice President and Provost is the chief academic officer of the university with responsibility for guiding the academic development and direction of the institution in accordance with the University's mission. As Senior Vice President, the Provost has budgetary responsibility for campus academic programs and resources and works directly with the President on campus-wide resource allocation. The Provost oversees the development, review, and implementation of all academic policies and regulations; consults closely with the University Senate and other faculty advisory groups on academic programs and policies; and serves as liaison with other university divisions in strategic and long-range planning. The deans of the 12 academic colleges and schools report to the Provost as do the deans for Undergraduate Studies, of the Graduate School, and of the University Libraries. The director of the Institute for Bioscience and Biotechnology Research and the Executive Director of the Universities at Shady Grove, both situated in Rockville, also report to the Provost. Other major academic administrative offices that report to the Provost include: Academic Planning and Programs; Diversity and Inclusion; Faculty Affairs; Enrollment Management; Institutional Research, Planning, and Assessment; International Affairs; Finance and Personnel; Records, Registration, and Extended Studies; the Teaching and Learning Transformation Center; and the Academy for Innovation and Entrepreneurship.

Division of Administration

2119 Thomas V. Miller Jr. Administration Building

301-405-1105
VPadmin (vpadmin@umd.edu)@umd.edu (vpaf@umd.edu)
adminvp.umd.edu (https://adminvp.umd.edu/)

Carlo Colella, Vice President and Chief Administrative Officer

The Division of Administration is responsible for the university's 1,352-acre physical environment, including over 14 million square feet of facilities; and provides a variety of administrative services in support of the university's mission. More than 1,300 staff members ensure a safe, well-maintained and clean environment; facilitate planning for the future of the campus and manage construction; manage purchasing, support transportation demand management; manage the real estate needs of the university and promote partnerships with surrounding communities.

Our operations include: Community Engagement; Environmental Safety, Sustainability and Risk; Facilities Management; Procurement and Business Services; Public Safety; Real Estate; Transportation Services, and University Human Resources.

Of particular interest to students are the services and resources offered by Public Safety; campus programs related to sustainability and climate action, and services offered by Transportation Services (parking, Shuttle-UM, Smart Commute).

Division of Information Technology

Phone: 301-405-1500
itsc@umd.edu

Jeffery Hollingsworth, Ph.D., Vice President and Chief Information Officer

The Division of Information Technology (DIT) is a strategic asset of the University of Maryland, College Park with the purpose of empowering students, faculty, and staff to use information technology to achieve all the university's three missions of teaching, scholarship, and full engagement in our community and the world.

We are a unit of knowledgeable and diverse staff that strives to build and maintain sound, advanced, secure and efficient information technology systems, capable of effectively serving the UMD community without barriers.

DIT proudly embraces our wide range of individual perspectives and experiences and highly values an open work environment that fosters the free exchange of ideas, mutual respect, and consideration for our differences.

Division of Student Affairs

2108 Clarence M. Mitchell Jr. Building
Phone: 301-314-8428
Fax: 301-314-9606
studentaffairs@umd.edu
www.studentaffairs.umd.edu (http://www.studentaffairs.umd.edu)

Patricia (Patty) Perillo, Ph.D., Vice President for Student Affairs

The Office of the Vice President for Student Affairs provides administrative leadership for 14 departments which oversee student life: Resident Life, Dining Services, Residential Facilities, Counseling Center, Health Center, Recreation & Wellness, Career Center, Student Conduct, The Stamp, Fraternity & Sorority Life, Conferences & Visitor Services, Parent & Family Affairs, Development & External Relations and the Dean of Students Office (inaugural opening 2021).

This office serves as a point of contact for non-academic student services and concerns. In addition, the office provides support for the BETA Team, Student Success Initiative, Student Crisis Fund, and Omicron Delta Kappa.

Division of University Relations

1132 Thomas V. Miller, Jr. Administration Building
301-405-4680
www.urhome.umd.edu (http://www.urhome.umd.edu)

Brodie Remington, Vice President

The Division of University Relations encompasses a variety of units whose shared mission is to advance the goals of the university by increasing resources and support, enhancing awareness and affinity, and strengthening and developing relationships with the Maryland family and the greater community. Units of this division include: Development (including school-, college- and unit-based staff), Annual Giving, Gift Planning, Corporate and Foundation Relations, Alumni Relations, Strategic Communications, Special Events, Donor Relations and Stewardship and the University of Maryland College Park Foundation. The *Fearless Ideas* campaign, which publicly launched in May 2018, has a goal to raise $1.5 billion in private support for university priorities such as undergraduate scholarships and faculty support. Through this endeavor, University Relations will drive internal and external stakeholders to invest the success of a bold and fearless generation of students charged with finding solutions to the Grand Challenges of our time.

Equity Council

2417 Marie Mount Hall
301-405-2838
https://diversity.umd.edu/our-team/equity-council/

Georgina Dodge, Ph.D., Vice President for Diversity & Inclusion

The Equity Council serves as an advisory group to the President and supports the longstanding and continuous goal of the University of Maryland to be a national leader in recruiting and retaining a diverse community of faculty, staff, and students. The council provides leadership in the articulation and development of affirmative action policies and procedures for the campus community. A particular focus of the Equity Council is to review and recommend, as appropriate, search and selection policies and procedures for the university and its colleges and departments. The Council consists of equity administrators from each Vice President and Dean's office and the Office of the President. The Chief Diversity Officer serves as Chair of the Council.

The current list of equity administrators at the university can be found at the Equity Council website: https://diversity.umd.edu/our-team/equity-council/.

Office of Diversity and Inclusion

2417 Marie Mount Hall
Phone: 301-405-2838
Fax: 301-314-9992
diverseterps@umd.edu
www.diversity.umd.edu (http://www.diversity.umd.edu)

Georgina Dodge, Ph.D., Vice President for Diversity & Inclusion

The Office of Diversity & Inclusion (ODI) provides active oversight, coordination, and evaluation of the University of Maryland's equity, diversity and inclusion activities; manages and tracks implementation of the Strategic Plan for Diversity; and encourages and supports the efforts of units to achieve their diversity goals. We invite you to explore our website for information about our office, its activities, and programs, as well as equity and diversity initiatives on campus and beyond.

For more information about ODI please go to http://www.diversity.umd.edu/.

Office of the President

1101 Thomas V. Miller, Jr. Administration Building
Phone: 301-405-5803
Fax: 301-314-9560
president@umd.edu
www.president.umd.edu (http://www.president.umd.edu)

Darryll J. Pines, Ph.D., President

The president is the chief executive officer of the University of Maryland. Nine vice presidents, who report directly to the president, manage different divisions of the campus administration. The Department

of Intercollegiate Athletics and the Maryland Fire and Rescue Institute report to the Office of the President. The University Senate, a representative legislative body of the university, advises the president on academic and other matters.

Office of Undergraduate Studies

2110 Marie Mount Hall
301-405-9363
ugst@umd.edu
www.ugst.umd.edu (http://www.ugst.umd.edu)

William Cohen, Ph.D., Associate Provost and Dean

Director of Administration and External Relations: Jacqueline Kautzer
Associate Dean for General Education: Douglas Roberts, Ph.D.
Associate Dean: Cynthia Kay Stevens, Ph.D.
Assistant Deans: Eric Van Johnson, Lisa Kiely, Ph.D., Kathryn Robinson, Ann Smith, Ph.D.
Assistant Director of Communications and Web Development: Laura Cech

Through its many programs, the Office of Undergraduate Studies serves all undergraduate students at the university and the faculty and staff that support the undergraduate mission of the campus. The Office of Undergraduate Studies is the primary division at the University of Maryland responsible for leadership and oversight of undergraduate curricular and co-curricular education.

For more information about the programs in the Office of Undergraduate Studies, please see this section of the catalog (https://academiccatalog.umd.edu/undergraduate/colleges-schools/undergraduate-studies/).

The Graduate School

2123 Lee Building
7809 Regents Drive
Phone: 301-405-3644
gradschool@umd.edu
www.gradschool.umd.edu (http://www.gradschool.umd.edu)

Steve Fetter, Ph.D., Associate Provost and Dean

The Graduate School, under the leadership of its Dean, establishes and oversees procedures to enact policies and serves as an advocate for excellence in all aspects of graduate education. The Graduate School, on behalf of its Dean, officially admits all students into graduate degree programs and acts as the conferring body for all graduate degrees.

More information on the Graduate School can be found in the Graduate Catalog (p. 15).

University Senate

1100 Marie Mount Hall
Phone: 301-405-5805
Fax: 301-405-5749
senate-admin@umd.edu
www.senate.umd.edu (http://www.senate.umd.edu)

Reka S. Montfort, Executive Secretary and Director

The University Senate, an integral part of the university's system of shared governance, has representation from all segments of the campus community: faculty, staff, undergraduate students, and graduate students. Participation in the Senate or any of its 10 Standing Committees is an honor and a responsibility.

The full Senate meets approximately nine times a year to consider matters of concern to the institution, including academic issues, university policies, plans of organization, and other matters that affect faculty, staff, and students. The Senate advises the president, the chancellor, or the Board of Regents, as appropriate. To become an undergraduate student Senator, students must be elected by other students in the advising college of their primary major or the Office of Undergraduate Studies in centralized, online elections. Elections are held every year during the spring semester. All students are also encouraged to participate in Senate standing committees, such as Student Affairs and Campus Affairs. These committees draw membership from the campus community at large and cover every aspect of campus life and function. Details about the election and committee volunteer processes can be found at www.senate.umd.edu (http://www.senate.umd.edu).

INDEX

#

12-Week Term Calendar 1054

A

AASP - African American Studies 595
AAST - Asian American Studies 596
About the University 1053
Academic Calendars 1054
Academic Record 1022
Accounting (BMAC) 23
Accounting, Master of Science (M.S.) 24
Accreditation 1056
Additive Manufacturing, Master of Engineering (M.Eng.) 25
Additive Manufacturing (PMAM) 26
Additive Manufacturing, Post-Baccalaureate Certificate (P.B.C.) 26
Additive Manufacturing (Z115) 25
Administration, Supervision & Curriculum, Certificate of Advanced Study (C.A.S.) 27
Administration, Supervision & Curriculum (Z900) 27
Admissions Policies 999
Aerospace Engineering, Doctor of Philosophy (Ph.D.) 28
Aerospace Engineering (ENAE) 27
Aerospace Engineering, Master of Engineering (M.Eng.) 29
Aerospace Engineering, Master of Science (M.S.) 28
Aerospace Engineering (PMAE) 29
Aerospace Engineering, Post-Baccalaureate Certificate (P.B.C.) 30
Aerospace Engineering (Z053) 30
African American Studies, Post-Baccalaureate Certificate (P.B.C.) 31
African American Studies (Z096) 31
AGNR - Agriculture and Natural Resources 596
Agricultural and Resource Economics (AREC) 33
Agricultural and Resource Economics, Doctor of Philosophy (Ph.D.) 32
Agricultural and Resource Economics, Master of Science (M.S.) 32
Air Quality Science and Technology, Post-Baccalaureate Certificate (P.B.C.) 35
Air Quality Science and Technology (Z047) 35
American Studies (AMST) 36
American Studies, Doctor of Philosophy (Ph.D.) 36
American Studies, Master of Arts (M.A.) 35
AMSC - Applied Mathematics & Scientific Computation 597
AMST - American Studies 599
Animal Sciences (ANSC) 38
Animal Sciences, Doctor of Philosophy (Ph.D.) 37
Animal Sciences, Master of Science (M.S.) 37
ANSC - Animal Science 600
ANTH - Anthropology 602
Anthropology and Historic Preservation, Master of Applied Anthropology and Master of Historic Preservation (dual degree) (M.A.A. and M.H.P.) .. 39
Anthropology and Historic Preservation, Master of Applied Anthropology and Master of Historic Preservation (dual degree) (M.A.A. and M.H.P.) .. 42
Anthropology (ANTH) 41
Anthropology, Doctor of Philosophy (Ph.D.) 40
Anthropology, Master of Applied Anthropology (M.A.A.) 40
AOSC - Atmospheric and Oceanic Science 609
Appendices 1050
Applied Anthropology and Historic Preservation (AAHP) 43
Applied Counseling and Human Services, Post-Baccalaureate Certificate (P.B.C.) 44
Applied Counseling and Human Services (Z069) 44
Applied Economics, Master of Professional Studies (M.P.S.) 45
Applied Economics, Master of Professional Studies (M.P.S.) 45
Applied Economics (off-campus) (MPEC) 45
Applied Economics (on-campus) (MPEM) 46
Applied Entomology, Master of Professional Studies (M.P.S.) 46
Applied Entomology (MPAE) 46
Applied Mathematics & Statistics, and Scientific Computation (AMSC) . 49
Applied Mathematics & Statistics, and Scientific Computation, Doctor of Philosophy (Ph.D.) 48
Applied Mathematics & Statistics, and Scientific Computation, Master of Science (M.S.) 47
ARAB - Arabic 614
ARCH - Architecture 614
Architecture and Community Planning (ARCP) 54
Architecture and Community Planning, Master of Architecture and Master of Community Planning (dual degree) (M.Arch. and M.C.P.) 53
Architecture and Historic Preservation (ARHP) 55
Architecture and Historic Preservation,Master of Architecture and Master of Historic Preservation (dual degree) (M.Arch. and M.H.P.) 54
Architecture and Real Estate Development (ARDV) 57
Architecture and Real Estate Development, Master of Architecture and Master of Real Estate Development (dual degree) (M.Arch. and M.R.E.D.) 56
Architecture (ARCH) 51
Architecture, Master of Architecture (M.Arch.) 50
Architecture, Master of Science (M.S.) 51
AREC - Agricultural and Resource Economics 619
ARHU - Arts and Humanities 622
ARMY - Army 623

ARSC - Air Science 623
Art History and Archaeology (ARTH) 59
Art History and Archaeology, Doctor of Philosophy (Ph.D.) 59
Art History and Archaeology, Master of Arts (M.A.) 59
Art Studio (ARTT) 61
Art Studio, Master of Fine Arts (M.F.A.) 61
ARTH - Art History & Archaeology 623
ARTT - Art Studio 625
ASTR - Astronomy 626
Astronomy (ASTR) 63
Astronomy, Doctor of Philosophy (Ph.D.) 63
Astronomy, Master of Science (M.S.) 62
Atmospheric & Oceanic Science (Z046) 68
Atmospheric and Oceanic Science (AOSC) 66
Atmospheric and Oceanic Science, Doctor of Philosophy (Ph.D.) 65
Atmospheric and Oceanic Science, Master of Science (M.S.) 65
Atmospheric and Oceanic Science, Post-Baccalaureate Certificate (P.B.C.) 68
Atmospheric and Oceanic Science Technology, Master of Professional Studies (M.P.S.) 67
Atmospheric and Oceanic Science Technology (MPAO) 68

B

BCHM - Biochemistry 628
Beekeeping, Post-Baccalaureate Certificate (P.B.C.) 69
Beekeeping (Z088) 69
BEES - Behavior, Ecology, Evolution and Systematics 629
Behavioral and Community Health (BCHL) 70
Behavioral and Community Health, Doctor of Philosophy (Ph.D.) 70
Behavioral and Community Health, Master of Public Health (M.P.H.) 71
Behavioral and Community Health (MBCH) 72
BERC - Ctr for Stdy of Busns,Ethics,Regulatn,Crime 629
Biochemistry (BCHM) 74
Biochemistry, Doctor of Philosophy (Ph.D.) 73
Biochemistry, Master of Science (M.S.) 73
BIOE - Bioengineering 630
Bioengineering (BIOE) 76
Bioengineering, Doctor of Medicine and Doctor of Philosophy (dual degree) (M.D. and Ph.D.) 75
Bioengineering, Doctor of Medicine and Master of Science (dual degree) (M.D. and M.S.) 75
Bioengineering, Doctor of Philosophy (Ph.D.) 75
Bioengineering, Master of Engineering (M.Eng.) 77
Bioengineering, Master of Engineering (M.Eng.) 80
Bioengineering, Master of Science (M.S.) 75
Bioengineering (online) (MEBI) 77
Bioengineering (online) (Z083) 79
Bioengineering (PMBI) 80
Bioengineering, Post-Baccalaureate Certificate (P.B.C.) 78
Bioengineering, Post-Baccalaureate Certificate (P.B.C.) 81
Bioengineering (Z054) 81
BIOL - Biology 634
Biological Resource Engineering, Doctor of Philosophy (Ph.D.) 82
Biological Resources Engineering (ENBE) 82
Biological Resources Engineering, Master of Science (M.S.) 82
Biological Sciences (BISI) 83
Biological Sciences, Doctor of Philosophy (Ph.D.) 83
Biological Sciences, Master of Science (M.S.) 82
BIOM - Biometrics 635
Biophysics (BIPH) 86
Biophysics, Doctor of Philosophy (Ph.D.) 85
Biophysics, Master of Science (M.S.) 85
Biostatistics (BIOS) 87
Biostatistics, Master of Public Health (M.P.H.) 87
BIPH - Biophysics 636
BISI - Biological Sciences 636
BMGT - Business and Management 636
BSCI - Biological Sciences Program 644
BSOS - Behavioral and Social Sciences 647
BSST - Terrorism Studies 647
BUDT - Decision and Information Technologies 648
BUFN - Finance 650
BULM - Logistics, Business, and Public Policy 655
BUMK - Marketing 657
BUMO - Management and Organization 660
BUSI - Part-Time MBA Program 662
Business Administration and Accounting (BAAC) 89
Business Administration and Accounting, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.) 88
Business Administration and Finance (BAFN) 93
Business Administration and Finance, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.Fin.) 93
Business Administration and Information Systems (BAIS) 94
Business Administration and Information Systems, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.) 94
Business Administration and Marketing Analytics (BAMA) 95
Business Administration and Marketing Analytics, Master of Business Administration and Master of Science (Dual Degree) (M.B.A. and M.S.) 95
Business Administration and Nursing (BNRS) 97

Business Administration and Nursing, Master of Business Administration and Doctor of Philosophy (dual degree) (M.B.A. and Ph.D.) 96

Business Administration and Nursing, Master of Business Administration and Master of Science (dual degree) (M.B.A. and M.S.) 96

Business Administration and Pharmacy (BPHR) 99

Business Administration and Pharmacy, Master of Business Administration and Doctor of Pharmacy (Dual Degree) (M.B.A. and Pharm.D.) 99

Business Administration and Public Policy (BMPO) 100

Business Administration and Public Policy, Master of Business Administration and Master of Public Policy (Dual Degree) (M.B.A. and M.P.P.) 100

Business Administration and Real Estate Development, Master of Business Administration and Master of Real Estate Development (Dual Degree) (M.B.A. and M.R.E.D.) 101

Business Administration and Real Estate Development (MBRE) 102

Business Administration and Social Work (BMSW) 103

Business Administration and Social Work, Master of Business Administration and Master of Social Work (Dual Degree) (M.B.A. and M.S.W.) 102

Business Administration and Supply Chain Management 104

Business Administration and Supply Chain Management (BASC) 104

Business Administration (BMBA) 90

Business Administration (Executive) (CMBA) 91

Business Administration (Executive) (EMBA) 92

Business Administration Executive, Master of Business Administration (M.B.A.) 91

Business Administration Executive, Master of Business Administration (M.B.A.) 92

Business Administration, Master of Business Administration (M.B.A.) .. 89

Business Administration (Online), Master of Business Administration (M.B.A.) 97

Business Administration (online) (OMBA) 97

Business Analytics (BMAN) 105

Business Analytics, Master of Science (M.S.) 105

Business and Management (BMSB) 106

Business and Management (BPHD) 107

Business and Management, Doctor of Philosophy (Ph.D.) 106

Business and Management, Master of Science (M.S.) 106

Business Management and Law (LMBA) 108

Business Management and Law, Master of Business Administration and Juris Doctorate (Dual Degree) (M.B.A. and J.D.) 108

BUSM - Full-Time MBA Program 668

C

CBMG - Cell Biology & Molecular Genetics 674

CCJS - Criminology and Criminal Justice 674

CHBE - Chemical and Biomolecular Engineering 677

CHEM - Chemistry 682

Chemical and Biomolecular Engineering, Master of Engineering (M.Eng.) 109

Chemical and Biomolecular Engineering (PMCH) 109

Chemical and Biomolecular Engineering, Post-Baccalaureate Certificate (P.B.C.) 110

Chemical and Biomolecular Engineering (Z055) 110

Chemical and Life Sciences (CLFS) 113

Chemical and Life Sciences, Master of Chemical and Life Sciences (M.C.L.F.S.) 113

Chemical Engineering, Doctor of Philosophy (Ph.D.) 111

Chemical Engineering (ENCH) 112

Chemical Engineering, Master of Science (M.S.) 111

Chemical Physics (CHPH) 115

Chemical Physics, Doctor of Philosophy (Ph.D.) 114

Chemical Physics, Master of Science (M.S.) 114

Chemistry (CHEM) 117

Chemistry, Doctor of Philosophy (Ph.D.) 116

Chemistry, Master of Science (M.S.) 116

CHIN - Chinese 683

CHPH - Chemical Physics 685

Civil and Environmental Engineering, Doctor of Philosophy (Ph.D.) 118

Civil and Environmental Engineering (ENCE) 119

Civil and Environmental Engineering, Master of Engineering (M.Eng.) .. 120

Civil and Environmental Engineering, Master of Science (M.S.) 118

Civil and Environmental Engineering (PMCE) 120

Civil and Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.) 121

Civil and Environmental Engineering (Z056) 122

CLAS - Classics 685

Classics (CLAS) 123

Classics, Master of Arts (M.A.) 122

CLFS - Chemical and Life Sciences 685

Clinical Audiology (CAUD) 125

Clinical Audiology, Combined Doctor of Audiology and Doctor of Philosophy (Au.D./Ph.D.) 124

Clinical Audiology, Doctor of Audiology (Au.D.) 124

Clinical Psychological Science, Master of Professional Studies (M.P.S.) 126

Clinical Psychological Science (MPPS) 127

CMLT - Comparative Literature 686

CMSC - Computer Science 687

Combined Bachelor's-Master's Programs 1037

COMM - Communication 695

Communication (COMM) 128

Communication, Doctor of Philosophy (Ph.D.) ... 127
Communication Management, Post-Baccalaureate Certificate (P.B.C.) 129
Communication Management (Z045) ... 129
Communication, Master of Arts (M.A.) ... 127
Community Counseling (COCM) ... 130
Community Counseling, Master of Arts (M.A.) ... 129
Community Counseling, Master of Education (M.Ed.) ... 130
Community Planning and Historic Preservation (CPHP) ... 132
Community Planning and Historic Preservation, Master of Community Planning and Master of Historic Preservation (dual degree) (M.C.P. and M.H.P.) ... 131
Community Planning and Law (LCPL) ... 133
Community Planning and Law, Master of Community Planning and Juris Doctorate (Dual Degree) (M.C.P. and J.D.) ... 133
Community Planning (CMPL) ... 130
Community Planning, Master of Community Planning (M.C.P.) ... 130
Comparative Literature (CMLT) ... 134
Comparative Literature, Doctor of Philosophy (Ph.D.) ... 134
Computational Harmonic Analysis, Post-Baccalaureate Certificate (P.B.C.) ... 135
Computational Harmonic Analysis (Z023) ... 135
Computational Methods in Atmospheric & Oceanic Science, Post-Baccalaureate Certificate (P.B.C.) ... 136
Computational Methods in Atmospheric & Oceanic Science (Z048) ... 136
Computer Networking, Post-Baccalaureate Certificate (P.B.C.) ... 136
Computer Networking (Z117) ... 136
Computer Science (CMSC) ... 137
Computer Science, Doctor of Philosophy (Ph.D.) ... 137
Computer Science, Master of Science (M.S.) ... 137
Computing Systems, Post-Baccalaureate Certificate (P.B.C.) ... 138
Computing Systems (Z118) ... 138
CONS - Sustainable Development & Conservation Biology ... 702
Consecutive Interpreting, Post-Baccalaureate Certificate (P.B.C.) ... 139
Consecutive Interpreting (Z080) ... 139
Corporate Innovation, Master of Professional Studies (M.P.S.) ... 140
Corporate Innovation (MPCI) ... 140
Counseling & Personnel Services, Certificate of Advanced Study (C.A.S.) ... 141
Counseling & Personnel Services (Z901) ... 141
Counseling Psychology (COCP) ... 142
Counseling Psychology, Doctor of Philosophy (Ph.D.) ... 141
Counseling Psychology, Master of Arts (M.A.) ... 141
Couple and Family Therapy (FCFT) ... 144
Couple and Family Therapy, Master of Science (M.S.) ... 144
Course Listing ... 593
Creative Writing (CRWR) ... 146
Creative Writing, Master of Fine Arts (M.F.A.) ... 145
Criminology and Criminal Justice (CJCH) ... 147
Criminology and Criminal Justice (CRIM) ... 148
Criminology and Criminal Justice, Doctor of Philosophy (Ph.D.) ... 148
Criminology and Criminal Justice, Master of Arts (M.A.) ... 147
Criminology and Criminal Justice, Master of Arts (M.A.) ... 148
Critical Theory, Post-Baccalaureate Certificate (P.B.C.) ... 149
Critical Theory (Z017) ... 149
Cultural and Heritage Resource Management, Master of Professional Studies (M.P.S.) ... 150
Cultural and Heritage Resource Management (MPCH) ... 150
Cultural and Heritage Resource Management, Post-Baccalaureate Certificate (P.B.C.) ... 151
Cultural and Heritage Resource Management (Z121) ... 151
Curation and Management of Digital Assets (online) (Z093) ... 152
Curation and Management of Digital Assets, Post-Masters Certificate (P.M.C.) ... 151
Curriculum and Instruction, Certificate of Advanced Study (C.A.S.) ... 155
Curriculum and Instruction (EDCI) ... 153
Curriculum and Instruction, Master of Arts (M.A.) ... 153
Curriculum and Instruction, Master of Education (M.Ed.) ... 153
Curriculum and Instruction, Post-Baccalaureate Certificate (P.B.C.) ... 153
Curriculum and Instruction (Z902) ... 155
Cybersecurity Engineering, Master of Engineering (M.Eng.) ... 156
Cybersecurity Engineering (online) (Z092) ... 155
Cybersecurity Engineering (PMCY) ... 156
Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.) ... 155
Cybersecurity Engineering, Post-Baccalaureate Certificate (P.B.C.) ... 157
Cybersecurity Engineering (Z073) ... 158
Cybersecurity Leadership, Post-Baccalaureate Certificate (P.B.C.) ... 159
Cybersecurity Leadership (Z077) ... 159
Cybersecurity, Master of Engineering (M.Eng.) ... 159
Cybersecurity (online) (MECY) ... 159

D

DANC - Dance ... 702
Dance (DANC) ... 161
Dance, Master of Fine Arts (M.F.A.) ... 160
Data Science, Post-Baccalaureate Certificate (P.B.C.) ... 162
Data Science (Z104) ... 162
Digital Studies, Post-Baccalaureate Certificate (P.B.C.) ... 163
Digital Studies (Z110) ... 163
Division of Academic Affairs ... 1057

Division of Administration and Finance 1057
Division of Information Technology 1058
Division of Student Affairs 1058
Division of University Relations 1058
Doctoral Degrees Policies 1031
Dual Doctoral and Master's Degrees 1037

E

Ecological Economics, Post-Baccalaureate Certificate (P.B.C.) 163
Ecological Economics (Z009) 164
ECON - Economics 704
Economic Analysis (off-campus) (Z074) 164
Economic Analysis (on-campus) (Z098) 165
Economic Analysis, Post-Baccalaureate Certificate (P.B.C.) 164
Economic Analysis, Post-Baccalaureate Certificate (P.B.C.) 165
Economics, Doctor of Philosophy (Ph.D.) 166
Economics (ECON) 167
Economics, Master of Arts (M.A.) 166
Ecosystems Restoration, Post-Baccalaureate Certificate (P.B.C.) 168
Ecosystems Restoration (Z041) 168
EDCI - Curriculum and Instruction 714
EDCP - Education Counseling and Personnel Services 716
EDHD - Education, Human Development 721
EDHI - Education Leadership, Higher Ed and International Ed 727
EDMS - Measurement, Statistics, and Evaluation 730
EDPS - Education Policy Studies 732
EDSP - Education, Special 732
EDUC - Education 740
Electrical and Computer Engineering, Doctor of Philosophy (Ph.D.) 168
Electrical and Computer Engineering (ENEE) 168
Electrical and Computer Engineering, Master of Engineering (M.Eng.) . 170
Electrical and Computer Engineering, Master of Science (M.S.) 168
Electrical and Computer Engineering (PMEE) 171
Electrical and Computer Engineering, Post-Baccalaureate Certificate (P.B.C.) 172
Electrical and Computer Engineering (Z057) 172
Electronic Packaging (online) (Z111) 173
Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.) 173
Electronic Packaging, Post-Baccalaureate Certificate (P.B.C.) 174
Electronic Packaging (Z112) 174
Elementary & Middle School Science Education (Z051) 175
Elementary and Middle School Science Education, Post-Baccalaureate Certificate (P.B.C.) 175
EMBA - Executive MBA Program 741
ENAE - Engineering, Aerospace 744
ENBE - Biological Resources Engineering 749
ENCE - Engineering, Civil 749
ENCH - Engineering, Chemical 755
ENEE - Electrical & Computer Engineering 757
Energetic Concepts Engineering, Master of Engineering (M.Eng.) 175
Energetic Concepts Engineering (online) (MEEC) 175
Energetic Concepts Engineering (online) (Z072) 175
Energetic Concepts Engineering, Post-Baccalaureate Certificate (P.B.C.) 175
Energy Systems Engineering, Master of Engineering (M.Eng.) 175
Energy Systems Engineering, Master of Engineering (M.Eng.) 178
Energy Systems Engineering (online) (MEEE) 176
Energy Systems Engineering (online) (Z082) 177
Energy Systems Engineering (PMSU) 178
Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) .. 177
Energy Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) .. 179
Energy Systems Engineering (Z066) 179
Energy Systems Management and Policy, Post-Baccalaureate Certificate (P.B.C.) 180
Energy Systems Management and Policy (Z107) 180
ENES - Engineering Science 765
ENFP - Engineering, Fire Protection 768
Engineering and Public Policy, Master of Engineering and Public Policy (M.Eng.Pub.Pol.) 180
Engineering and Public Policy (MEPP) 180
ENGL - English 771
English Language and Literature, Doctor of Philosophy (Ph.D.) 181
English Language and Literature (ENGL) 182
English Language and Literature, Master of Arts (M.A.) 181
ENMA - Engineering, Materials 778
ENME - Engineering, Mechanical 786
ENNU - Engineering, Nuclear 794
ENPM - Engineering, Professional Masters 795
ENPP - Engineering and Public Policy 801
ENRE - Reliability Engineering 801
ENSE - Systems Engineering 803
ENSP - Environmental Science and Policy 804
ENST - Environmental Science and Technology 805
ENTM - Entomology 810
Entomology, Doctor of Philosophy (Ph.D.) 183
Entomology (ENTM) 183
Entomology, Master of Science (M.S.) 183

ENTS - Telecommunications 811
Environmental Engineering, Master of Engineering (M.Eng.) 185
Environmental Engineering (PMEN) 185
Environmental Engineering, Post-Baccalaureate Certificate (P.B.C.) 186
Environmental Engineering (Z058) 186
Environmental Health Sciences, Doctor of Philosophy (Ph.D.) 188
Environmental Health Sciences (ENVH) 188
Environmental Health Sciences, Master of Public Health (M.P.H.) 189
Environmental Health Sciences, Master of Science (M.S.) 187
Environmental Health Sciences (MIEH) 189
Environmental Policy (EPOL) 191
Environmental Policy, Post-Baccalaureate Certificate (P.B.C.) 191
Environmental Policy, Post-Baccalaureate Certificate (P.B.C.) 191
Environmental Policy (Z008) 191
Environmental Science and Technology, Doctor of Philosophy (Ph.D.) . 192
Environmental Science and Technology (ENST) 192
Environmental Science and Technology, Master of Science (M.S.) 191
EPIB - Epidemiology and Biostatistics 813
Epidemiology, Doctor of Philosophy (Ph.D.) 195
Epidemiology (EPDM) 194
Epidemiology (EPID) 195
Epidemiology, Master of Public Health (M.P.H.) 193
Equity Council 1058
Ethnomusicology, Doctor of Philosophy (Ph.D.) 196
Ethnomusicology, Master of Arts (M.A.) 196
Ethnomusicology (MUET) 197
Executive Public Policy (EXPM) 198
Executive Public Policy, Master of Public Management (M.P.M.) 198

F

Faculty Listing 417
Family Science, Doctor of Philosophy (Ph.D.) 199
Family Science (FMSC) 199
Family Science, Master of Science (M.S.) 199
FILM - Film Studies 817
Finance (BMFN) 201
Finance, Master of Finance (M.Fin.) 200
Fire Protection Engineering (ENFP) 202
Fire Protection Engineering, Master of Engineering (M.Eng.) 203
Fire Protection Engineering, Master of Engineering (M.Eng.) 205
Fire Protection Engineering, Master of Science (M.S.) 201
Fire Protection Engineering (online) (ENGF) 203
Fire Protection Engineering (online) (Z049) 204
Fire Protection Engineering (PMFP) 206
Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.) 204
Fire Protection Engineering, Post-Baccalaureate Certificate (P.B.C.) 206
Fire Protection Engineering (Z059) 207
FMSC - Family Science 818
FOLA - Foreign Language 822
Food Safety Risk Assessment, Post-Baccalaureate Certificate (P.B.C.) . 207
Food Safety Risk Assessment (Z027) 207
FREN - French 822
French Modern Studies, Doctor of Philosophy (Ph.D.) 208
French Studies (FRIT) 209
French Studies, Master of Arts (M.A.) 209

G

GEOG - Geographical Sciences 824
Geographical Science, Master of Science (M.S.) 210
Geographical Sciences, Doctor of Philosophy (Ph.D.) 210
Geographical Sciences (GEOG) 210
GEOL - Geology 832
Geology, Doctor of Philosophy (Ph.D.) 213
Geology (GEOL) 213
Geology, Master of Science (M.S.) 213
Geospatial Information Science, Master of Professional Studies (M.P.S.) 214
Geospatial Information Science (MPGC) 215
Geospatial Information Sciences, Master of Professional Studies (M.P.S.) 215
Geospatial Information Sciences (MPGS) 215
Geospatial Information Sciences, Post-Baccalaureate Certificate (P.B.C.) 215
Geospatial Information Sciences (Z035) 215
Geospatial Intelligence, Master of Professional Studies (M.P.S.) 216
Geospatial Intelligence (MPGI) 217
Geospatial Intelligence, Post-Baccalaureate Certificate (P.B.C.) 217
Geospatial Intelligence (Z109) 217
GERM - Germanic Studies 837
German Literature and Language, Doctor of Philosophy (Ph.D.) 218
German Literature and Language (GERS) 218
German Literature and Language, Master of Arts (M.A.) 218
Gerontology (doctoral level) (Z101) 219
Gerontology (master's level) (Z100) 220
Gerontology, Post-Baccalaureate Certificate (P.B.C.) 219
Gerontology, Post-Baccalaureate Certificate (P.B.C.) 220
Global Health, Post-Baccalaureate Certificate (P.B.C.) 221

Global Health (Z070) 221
Government & The Private Economy (Z002) 223
Government and Politics, Doctor of Philosophy (Ph.D.) 222
Government and Politics (GVPT) 222
Government and Politics, Master of Arts (M.A.) 222
Government and the Private Economy, Post-Baccalaureate Certificate (P.B.C.) 223
Graduate Catalog 15
Graduate Certificate Policies 1038
Graduate School Field Committees 1038
Graduate School Services 1048
Graduate Student Fellowships 1018
GREK - Greek 839
GVPT - Government and Politics 839

H

HACS - ACES-Cybersecurity 845
Health Administration (HLSA) 224
Health Administration, Master of Health Administration (M.H.A.) 224
Health Equity (HLEQ) 225
Health Equity, Master of Public Health (M.P.H.) 224
Health Policy Analysis and Evaluation (HPAE) 226
Health Policy Analysis and Evaluation, Master of Public Health (M.P.H.) 226
Health Services, Doctor of Philosophy (Ph.D.) 227
Health Services (PHHS) 228
Hearing and Speech Sciences, Doctor of Audiology (Au.D.) 229
Hearing and Speech Sciences, Doctor of Philosophy (Ph.D.) 229
Hearing and Speech Sciences (HESP) 229
Hearing and Speech Sciences, Master of Arts (M.A.) 229
HEBR - Hebrew 845
HESI - Higher Ed, Student Affairs, and International Ed Policy 845
HESP - Hearing and Speech Sciences 846
Higher Education, Doctor of Philosophy (Ph.D.) 231
Higher Education (HIED) 231
Higher Education, Master of Arts (M.A.) 231
HISP - Historic Preservation 852
HIST - History 853
Historic Preservation and Real Estate Development (HPDV) 235
Historic Preservation and Real Estate Development, Master of Historic Preservation and Master of Real Estate Development (dual degree) (M.H.P. and M.R.E.D.) 235
Historic Preservation (HISP) 233
Historic Preservation, Master of Historic Preservation (M.H.P.) 233
Historic Preservation, Post-Baccalaureate Certificate (P.B.C.) 237
Historic Preservation (Z005) 237
History and Library & Information Science (HILS) 241
History and Library & Information Science, Master of Arts and Master of Library and Information Science (dual degree) (M.A. and M.L.I.S.) 241
History, Doctor of Philosophy (Ph.D.) 238
History (HIST) 239
History, Master of Arts (M.A.) 238
HLHP - Health and Human Performance 858
HLMN - Hillman Entrepreneurs Program 858
HLSA - Health Services Administration 858
HLTH - Health 862
Home 14
Housing, Finance & Development, Post-Baccalaureate Certificate (P.B.C.) 242
Housing, Finance & Development (Z007) 242
Human Development, Doctor of Philosophy (Ph.D.) 245
Human Development (EDHD) 245
Human Development Education, Certificate of Advanced Study (C.A.S.) 247
Human Development Education (Z903) 247
Human Development, Master of Arts (M.A.) 244
Human Development, Master of Education (M.Ed.) 244
Human-Computer Interaction (HCIM) 243
Human-Computer Interaction, Master of Science (M.S.) 243

I

IMMR - Immigration Studies 865
Industrial/Organizational Psychology, Master of Professional Studies (M.P.S.) 248
Industrial/Organizational Psychology (MPIO) 247
INFM - Information Management 865
Information Assurance Management, Post-Baccalaureate Certificate (P.B.C.) 249
Information Assurance Management (Z026) 249
Information Management (INFM) 249
Information Management, Master of Information Management (M.I.M.) 250
Information Management, Master of Information Management (M.I.M.) 252
Information Management (online) (MIMO) 251
Information Studies, Doctor of Philosophy (Ph.D.) 253
Information Studies (INFS) 252
Information Systems (BMIS) 253
Information Systems, Master of Science (M.S.) 254
INST - Information Studies 867
Integrated Pest Management, Post-Baccalaureate Certificate (P.B.C.) . 255

Integrated Pest Management (Z089) ... 254
Intelligence Analysis, Post-Baccalaureate Certificate (P.B.C.) ... 256
Intelligence Analysis (Z021) ... 255
Intermediate Survey Methodology, Post-Baccalaureate Certificate in Intermediate Survey Methodology (P.B.C.) ... 256
Intermediate Survey Methodology (Z011) ... 256
International Education Policy, Doctor of Philosophy (Ph.D.) ... 258
International Education Policy (HIEP) ... 256
International Education Policy, Master of Arts (M.A.) ... 257
Interpreting, Master of Professional Studies (M.P.S.) ... 258
Interpreting (MPIN) ... 258
Introduction to the University of Maryland ... 17
ISRL - Israel Studies ... 877
ITAL - Italian ... 878

J

JAPN - Japanese ... 878
Jewish Studies (JWST) ... 259
Jewish Studies, Master of Arts (M.A.) ... 260
Jewish Studies, Post-Baccalaureate Certificate (P.B.C.) ... 260
Jewish Studies (Z018) ... 260
JOUR - Journalism ... 879
Journalism, Doctor of Philosophy (Ph.D.) ... 263
Journalism (JOMJ) ... 261
Journalism (JOST) ... 262
Journalism (JOUR) ... 263
Journalism, Master of Arts (M.A.) ... 264
Journalism, Master of Journalism (M.J.) ... 261
Justice Leadership, Master of Professional Studies (M.P.S.) ... 265
Justice Leadership (MPJL) ... 264
JWST - Jewish Studies ... 884

K

Kinesiology, Doctor of Philosophy (Ph.D.) ... 267
Kinesiology (KNES) ... 265
Kinesiology, Master of Arts (M.A.) ... 267
KNES - Kinesiology ... 886
KORA - Korean ... 890

L

Landscape Architecture and Community Planning (LACP) ... 267
Landscape Architecture and Community Planning, Master of Landscape Architecture and Master of Community Planning (dual degree) (M.L.A. and M.C.P.) ... 268
Landscape Architecture (LARC) ... 269
Landscape Architecture, Master of Landscape Architecture (M.L.A.) ... 270
LARC - Landscape Architecture ... 891
LASC - Certificate in Latin American Studies ... 893
LATN - Latin ... 893
LBSC - Library Science ... 894
Leadership Education & Development, Master of Professional Studies (M.P.S.) ... 271
Leadership Education & Development (MPLD) ... 271
LGBT - Lesbian Gay Bisexual Transgender Studies ... 896
Library and Information Science (LBSC) ... 271
Library and Information Science, Master of Library and Information Science (M.L.I.S.) ... 272
Library and Information Science, Master of Library and Information Science (M.L.I.S.) ... 274
Library and Information Science (online) (LBSO) ... 273
LING - Linguistics ... 897
Linguistics, Doctor of Philosophy (Ph.D.) ... 276
Linguistics (LING) ... 274
Linguistics, Master of Arts (M.A.) ... 276
Literacy Coaching, Post-Baccalaureate Certificate (P.B.C.) ... 278
Literacy Coaching (Z038) ... 277

M

MAIT - Masters in the Mathematics of Advanced Industrial Tech ... 899
Marine, Estuarine, and Environmental Sciences, Doctor of Philosophy (Ph.D.) ... 280
Marine, Estuarine, and Environmental Sciences, Master of Science (M.S.) ... 279
Marine, Estuarine, and Environmental Sciences (MEES) ... 278
Marketing Analytics (BMMA) ... 280
Marketing Analytics, Master of Science (M.S.) ... 281
Master's Degrees Policies ... 1026
Materials Science and Engineering, Doctor of Philosophy (Ph.D.) ... 283
Materials Science and Engineering (ENMA) ... 281
Materials Science and Engineering, Master of Engineering (M.Eng.) ... 284
Materials Science and Engineering, Master of Science (M.S.) ... 283
Materials Science and Engineering (PMMS) ... 283
Materials Science and Engineering, Post-Baccalaureate Certificate (P.B.C.) ... 285
Materials Science and Engineering (Z060) ... 284
Maternal and Child Health, Doctor of Philosophy (Ph.D.) ... 286
Maternal and Child Health (MCHS) ... 285
MATH - Mathematics ... 900
Mathematical Statistics, Doctor of Philosophy (Ph.D.) ... 288
Mathematical Statistics, Master of Arts (M.A.) ... 288
Mathematical Statistics (STAT) ... 287

Mathematics, Doctor of Philosophy (Ph.D.) 291
Mathematics, Master of Arts (M.A.) 291
Mathematics (MATH) 290
Mathematics of Advanced Industrial Technology (MAIT) 289
Mathematics of Advanced Industrial Technology, Master of Mathematics of Advanced Industrial Technology (M.M.A.I.T.) 289
Mathematics of Advanced Industrial Technology, Post-Baccalaureate Certificate (P.B.C.) 290
Mathematics of Advanced Industrial Technology (Z022) 289
Measurement, Statistics & Evaluation, Post-Baccalaureate Certificate (P.B.C.) 294
Measurement, Statistics & Evaluation (Z019) 294
Measurement, Statistics and Evaluation, Certificate of Advanced Study (C.A.S.) 293
Measurement, Statistics and Evaluation, Doctor of Philosophy (Ph.D.) . 293
Measurement, Statistics and Evaluation (EDMS) 292
Measurement, Statistics and Evaluation, Master of Arts (M.A.) 293
Measurement, Statistics and Evaluation, Master of Education (M.Ed.) . 293
Mechanical Engineering, Doctor of Philosophy (Ph.D.) 296
Mechanical Engineering (ENME) 294
Mechanical Engineering, Master of Engineering (M.Eng.) 297
Mechanical Engineering, Master of Science (M.S.) 296
Mechanical Engineering (PMME) 297
Mechanical Engineering, Post-Baccalaureate Certificate (P.B.C.) 299
Mechanical Engineering (Z061) 298
MEES - Marine-Estuarine-Environmental Sciences 905
Methods of Public Analysis, Post-Baccalaureate Certificate (P.B.C.) 300
Methods of Public Analysis (Z001) 299
MIEH - Maryland Institute for Applied Environmental Health 907
MITH - Maryland Institute for Technology in the Humanities 910
MLAW - MPower Undergraduate Law Programs 910
MOCB - Molecular and Cell Biology 910
Modern French Studies (FRMS) 208
MSDE Administrator I Certification, Post-Baccalaureate Certificate (P.B.C.) 300
MSDE Administrator I Certification (Z052) 300
MSMC - Museum Scholarship and Material Culture 910
MUED - Music Education 910
MUET - Ethnomusicology 912
Multimedia Journalism, Post-Baccalaureate Certificate (P.B.C.) 300
Multimedia Journalism (Z071) 300
MUSC - School of Music 912
Museum Scholarship & Material Culture, Post-Baccalaureate Certificate (P.B.C.) 301
Museum Scholarship & Material Culture (Z016) 301
Music, Doctor of Musical Arts (D.M.A.) 307
Music, Doctor of Philosophy (Ph.D.) 305
Music Education, Doctor of Philosophy (Ph.D.) 303
Music Education, Master of Arts (M.A.) 303
Music Education, Master of Music (M.Mus.) 303
Music Education (MUED) 301
Music, Master of Arts (M.A.) 305
Music, Master of Music (M.Mus.) 310
Music (MUSA) 303
Music (MUSC) 306
MUSP - Music Performance 918

N

NACS - Neuroscience & Cognitive Science 918
National Security Studies, Post-Baccalaureate Certificate (P.B.C.) 311
National Security Studies (Z003) 311
NAVY - Navy 919
Networking Software Development, Post-Baccalaureate Certificate (P.B.C.) 311
Networking Software Development (Z119) 311
Neuroscience and Cognitive Sciences, Post-Baccalaureate Certificate (P.B.C.) 312
Neuroscience and Cognitive Sciences (Z037) 312
Neurosciences and Cognitive Science, Doctor of Philosophy (Ph.D.) ... 314
Neurosciences and Cognitive Science, Master of Science (M.S.) 313
Neurosciences and Cognitive Science (NACS) 312
NFSC - Nutrition and Food Science 919
Nonprofit Management and Leadership, Post-Baccalaureate Certificate (P.B.C.) 315
Nonprofit Management and Leadership (Z116) 314
NRMT - Natural Resources Management 922
Nuclear Engineering, Doctor of Philosophy (Ph.D.) 315
Nuclear Engineering (ENNU) 315
Nuclear Engineering, Master of Engineering (M.Eng.) 315
Nuclear Engineering, Master of Engineering (M.Eng.) 315
Nuclear Engineering, Master of Science (M.S.) 315
Nuclear Engineering (online) (MENU) 315
Nuclear Engineering (online) (Z050) 315
Nuclear Engineering (PMNU) 315
Nuclear Engineering, Post-Baccalaureate Certificate (P.B.C.) 315
Nuclear Engineering, Post-Baccalaureate Certificate (P.B.C.) 315
Nuclear Engineering (Z062) 315
Nutrition and Food Science, Doctor of Philosophy (Ph.D.) 317
Nutrition and Food Science, Master of Science (M.S.) 316

Nutrition and Food Science (NFSC) 315

O

Office of Diversity and Inclusion 1058
Office of the President 1058
Office of Undergraduate Studies 1059
Organic and Sustainable Agriculture, Post-Baccalaureate Certificate (P.B.C.) 318
Organic and Sustainable Agriculture (Z090) 317
Other Graduate School Policies 1040

P

Performance, Master of Fine Arts (M.F.A.) 318
Performance (MFAP) 318
PERS - Persian 922
PHIL - Philosophy 922
Philosophy, Doctor of Philosophy (Ph.D.) 319
Philosophy, Master of Arts (M.A.) 319
Philosophy (PHIL) 319
PHSC - Public Health Science 924
PHYS - Physics 925
Physical Activity, Master of Public Health (M.P.H.) 321
Physical Activity (PHAC) 320
Physics, Doctor of Philosophy (Ph.D.) 322
Physics, Master of Science (M.S.) 322
Physics (PHYS) 321
Plant Science, Doctor of Philosophy (Ph.D.) 325
Plant Science, Master of Science (M.S.) 324
Plant Science (PLSC) 323
PLCY - Public Policy 929
PLSC - Plant Sciences 933
Policies 999
Policies for Graduate Assistantships 1010
Policy Studies, Doctor of Philosophy (Ph.D.) 326
Policy Studies (EDPS) 325
Policy Studies, Master of Arts (M.A.) 325
Policy Studies (POSI) 325
Population Studies, Post-Baccalaureate Certificate (P.B.C.) 327
Population Studies (Z036) 326
PORT - Portuguese 937
Principles of Public Health, Post-Baccalaureate Certificate (P.B.C.) 329
Principles of Public Health (Z076) 327
Professional Communication for Enhanced English Fluency (online) (Z106) 329
Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.) 329
Professional Communication for Enhanced English Fluency, Post-Baccalaureate Certificate (P.B.C.) 330
Professional Communication for Enhanced English Fluency (Z105) 330
Programs 19
Project Management, Master of Engineering (M.Eng.) 331
Project Management, Master of Engineering (M.Eng.) 334
Project Management (online) (MEPM) 330
Project Management (online) (Z040) 332
Project Management (PMPM) 333
Project Management, Post-Baccalaureate Certificate (P.B.C.) 332
Project Management, Post-Baccalaureate Certificate (P.B.C.) 335
Project Management (Z063) 334
PSYC - Psychology 937
Psychology, Doctor of Philosophy (Ph.D.) 336
Psychology, Master of Science (M.S.) 336
Psychology (PSYC) 335
PUAF - Public Policy 945
Public Administration, Master of Professional Studies (M.P.S.) 337
Public Administration (MPPA) 337
Public Financial Management, Post-Baccalaureate Certificate (P.B.C.) 338
Public Financial Management (Z094) 338
Public Health Informatics, Post-Baccalaureate Certificate (P.B.C.) 339
Public Health Informatics (Z028) 338
Public Health Practice and Policy, Master of Public Health (M.P.H.) 340
Public Health Practice and Policy (PHPP) 339
Public Management (MAMG) 340
Public Management, Master of Public Management (M.P.M.) 341
Public Management, Post-Baccalaureate Certificate (P.B.C.) 341
Public Management (Z004) 341
Public Policy and Law (LMPO) 342
Public Policy and Law, Master of Public Policy and Juris Doctorate (dual degree) (M.P.P. and J.D.) 342
Public Policy and Sustainable Development & Conservation Biology, Master of Public Policy and Master of Science (dual degree) (M.P.P. and M.S.) 345
Public Policy and Sustainable Development & Conservation Biology (PPCN) 344
Public Policy (MAPO) 343
Public Policy, Master of Public Policy (M.P.P.) 343
Public Sector Finance & Acquisition, Post-Baccalaureate Certificate (P.B.C.) 345
Public Sector Finance & Acquisition (Z033) 345

Q

Quantitative Finance (BMQF) 345
Quantitative Finance, Master of Quantitative Finance (M.Q.F.) 346

R

Radar Signal Processing, Post-Baccalaureate Certificate (P.B.C.) 346
Radar Signal Processing (Z031) 346
RDEV - Real Estate Development 945
Real Estate Development, Master of Professional Studies (M.P.S.) 347
Real Estate Development, Master of Real Estate Development (M.R.E.D.) 349
Real Estate Development (MPRE) 346
Real Estate Development, Post-Baccalaureate Certificate (P.B.C.) 351
Real Estate Development (RDEV) 347
Real Estate Development (Z029) 350
Registration Policies 1003
Regulatory Science and Engineering, Post-Baccalaureate Certificate (P.B.C.) 351
Regulatory Science and Engineering (Z087) 351
Reliability Engineering, Doctor of Philosophy (Ph.D.) 353
Reliability Engineering (ENRE) 351
Reliability Engineering, Master of Engineering (M.Eng.) 354
Reliability Engineering, Master of Engineering (M.Eng.) 356
Reliability Engineering, Master of Science (M.S.) 353
Reliability Engineering (online) (MERE) 353
Reliability Engineering (online) (Z042) 354
Reliability Engineering (PMRE) 355
Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.) 355
Reliability Engineering, Post-Baccalaureate Certificate (P.B.C.) 357
Reliability Engineering (Z064) 356
RELS - Religious Studies 947
Resources 1051
Risk, Compliance, and the Law, Post-Baccalaureate Certificate (P.B.C.) 358
Risk, Compliance, and the Law (Z108) 358
Robotics Engineering, Post-Baccalaureate Certificate (P.B.C.) 359
Robotics Engineering (Z084) 358
Robotics, Master of Engineering (M.Eng.) 361
Robotics (PMRO) 360
RUSS - Russian 947

S

School Counseling (COSC) 361
School Counseling, Master of Education (M.Ed.) 362
School Librarianship, Post-Baccalaureate Certificate (P.B.C.) 363
School Librarianship (Z114) 362
School Psychology, Certificate of Advanced Study (C.A.S.) 365
School Psychology (COSP) 363
School Psychology, Doctor of Philosophy (Ph.D.) 365
School Psychology, Master of Arts (M.A.) 365
School System Leadership, Doctor of Education (Ed.D.) 366
School System Leadership (EDUC) 366
Scientific Computation, Post-Baccalaureate Certificate (P.B.C.) 367
Scientific Computation (Z014) 367
Second Language Acquisition, Doctor of Philosophy (Ph.D.) 369
Second Language Acquisition, Master of Arts (M.A.) 368
Second Language Acquisition, Post-Baccalaureate Certificate (P.B.C.) . 370
Second Language Acquisition (SLMA) 367
Second Language Acquisition (SLPH) 368
Second Language Acquisition (Z081) 370
Semester Calendar 1054
SLAA - Second Language Acquisition and Application 948
SLAV - Slavic 949
SLLC - School of Languages, Literatures and Cultures 950
Sociology, Doctor of Philosophy (Ph.D.) 372
Sociology, Master of Arts (M.A.) 372
Sociology (SOCY) 371
SOCY - Sociology 951
Software Engineering, Master of Engineering (M.Eng.) 373
Software Engineering (PMES) 372
Software Engineering, Post-Baccalaureate Certificate (P.B.C.) 374
Software Engineering (Z065) 373
SPAN - Spanish 956
Spanish Language and Literature, Doctor of Philosophy (Ph.D.) 377
Spanish Language and Literature, Master of Arts (M.A.) 376
Spanish Language and Literature (SPAP) 374
Special Education, Certificate of Advanced Study (C.A.S.) 378
Special Education, Certificate of Advanced Study (C.A.S.) 381
Special Education, Doctor of Philosophy (Ph.D.) 380
Special Education (EDSP) 377
Special Education, Master of Arts (M.A.) 378
Special Education, Master of Education (M.Ed.) 379
Special Education (Z905) 380
Speech Language Pathology, Master of Arts (M.A.) 382
Speech Language Pathology (SPLA) 381
SPHL - Public Health 959
STAT - Statistics and Probability 961

Student Affairs, Doctor of Philosophy (Ph.D.) 385
Student Affairs (HISA) 383
Student Affairs, Master of Arts (M.A.) 384
Student Affairs, Master of Education (M.Ed.) 385
Supply Chain Management (BMSC) 385
Supply Chain Management, Master of Science (M.S.) 386
SURV - Survey Methodology 963
Survey and Data Science, Master of Professional Studies (M.P.S.) 387
Survey and Data Science (online) (MPDS) 386
Survey Methodology, Doctor of Philosophy (Ph.D.) 389
Survey Methodology, Master of Science (M.S.) 389
Survey Methodology (SURV) 388
Survey Statistics, Post-Baccalaureate Certificate (P.B.C.) 389
Survey Statistics (Z010) 389
Sustainable Development and Conservation Biology (CONS) 389
Sustainable Development and Conservation Biology, Master of Science (M.S.) 390
Systems Engineering (ENSE) 390
Systems Engineering, Master of Engineering (M.Eng.) 393
Systems Engineering, Master of Science (M.S.) 391
Systems Engineering (PMSE) 392
Systems Engineering, Post-Baccalaureate Certificate (P.B.C.) 394
Systems Engineering (Z067) 393

T

TDPS - Theatre, Dance and Performance Studies 970
Teaching and Learning, Policy and Leadership, Doctor of Philosophy (Ph.D.) 396
Teaching and Learning, Policy and Leadership, Master of Arts (M.A.) .. 396
Teaching and Learning, Policy and Leadership (TLPL) 395
Teaching English to Speakers of Other Languages, Post-Baccalaureate Certificate (P.B.C.) 395
Teaching English to Speakers of Other Languages (Z099) 394
Technology Entrepreneurship, Master of Professional Studies (M.P.S.) 397
Technology Entrepreneurship (MPTE) 396
Technology Ventures and Innovation, Post-Baccalaureate Certificate (P.B.C.) 398
Technology Ventures and Innovation (Z068) 397
Telecommunications (ENTS) 398
Telecommunications, Master of Science (M.S.) 398
Terrorism Analysis, Post-Baccalaureate Certificate (P.B.C.) 400
Terrorism Analysis (Z039) 399
The Graduate School 16
The Graduate School 1059
Theatre and Performance Studies, Doctor of Philosophy (Ph.D.) 403
Theatre and Performance Studies, Master of Arts (M.A.) 403
Theatre and Performance Studies (THPF) 402
Theatre Design, Master of Fine Arts (M.F.A.) 401
Theatre Design (MFAT) 400
THET - Theatre 970
TLPL - Teaching and Learning, Policy and Leadership 975
TLTC - Teaching and Learning Transformation Center 991
TOXI - Toxicology 991
Toxicology and Environmental Health, Doctor of Philosophy (Ph.D.) 404
Toxicology, Master of Science (M.S.) 404
Toxicology (TOXI) 404
Translation, Master of Professional Studies (M.P.S.) 405
Translation (MPTR) 404
Translation, Post-Baccalaureate Certificate (P.B.C.) 406
Translation (Z079) 405
Transportation Policy and Planning, Post-Baccalaureate Certificate (P.B.C.) 407
Transportation Policy and Planning (Z030) 406
Transportation Systems, Master of Engineering (M.Eng.) 407
Transportation Systems (online) (METS) 407
Transportation Systems (online) (Z102) 407
Transportation Systems, Post-Baccalaureate Certificate (P.B.C.) 407
Tuition, Fees, and Expenses 1008

U

UMEI - Maryland English Institute 991
UNIV - University Courses 992
University Administration and Deans 1057
University of Maryland Graduate Faculty Members 1039
University Senate 1059
Urban Agriculture, Post-Baccalaureate Certificate (P.B.C.) 407
Urban Agriculture (Z091) 407
Urban and Regional Planning and Design, Doctor of Philosophy (Ph.D.) 409
Urban and Regional Planning and Design (URPD) 408
Urban Design, Post-Baccalaureate Certificate (P.B.C.) 408
Urban Design (Z012) 408
URSP - Urban Studies and Planning 992
USLT - Latina/o Studies 993

V

Veterinary Medical Sciences, Doctor of Philosophy (Ph.D.) 411
Veterinary Medical Sciences, Master of Science (M.S.) 410
Veterinary Medical Sciences (VMSC) 409
Veterinary Medicine, Doctor of Veterinary Medicine (D.V.M.) 412

Veterinary Medicine (VMED) 411
VMSC - Veterinary Medical Sciences 994

W

Wireless Communications, Post-Baccalaureate Certificate (P.B.C.) 413
Wireless Communications (Z120) 412
WMST - Women's Studies 995
Women's Studies, Doctor of Philosophy (Ph.D.) 414
Women's Studies, Master of Arts (M.A.) 414
Women's Studies, Post-Baccalaureate Certificate (P.B.C.) 415
Women's Studies (WMST) 413
Women's Studies (Z006) 414
World Languages Education, Post-Baccalaureate Certificate (P.B.C.) ... 415
World Languages Education (Z095) 415

Y

Youth Experience, Post-Baccalaureate Certificate (P.B.C.) 416
Youth Experience (Z113) 415